I

a) $15x^4+61x^3+57x^2-11x-10=0$

$\pm \frac{1,2,5,10}{1,3,5,15}$

	15	61	57	-11	-10
-1	15	46	11	-22	12
1	15	76	133	122	112
$-\frac{2}{5}$	15	55	35	-25	0
	3	11	7	-5	
$-\frac{5}{3}$	15	36	-3	-6	0
	5	12	-1	-2	

$x \in \{-\frac{2}{5}, \frac{5}{3}, -1 \pm \sqrt{2}\}$

$(5x+2)(3x+5)(x^2+2x-1)$ 3pts

b) $36x^4-108x^3+29x^2+48x-20=0$

$\pm \frac{1,2,4,5,10,20}{1,2,3,4,6,9,12,18,36}$

	36	-108	29	48	-20
-1	36	-144	173	-125	105
1	36	-72	-43	5	-15
$\frac{2}{3}$	36	-90	-16	40	0
	18	-45	-8	20	
$\frac{2}{3}$	36	-84	-27	30	0
	12	-28	-9	10	
$\frac{5}{2}$	36	-18	-16	8	0
	18	-9	-8	4	
$-\frac{2}{3}$	36	-132	117	-30	0
	12	44	39	-10	

$x \in \{-\frac{2}{3}, \frac{1}{2}, \frac{2}{3}, \frac{5}{2}\}$

3 pts

$(3x+2)(2x-1)(3x-2)(2x-5)$

II

a) (1) x = # of additional records

$(100+x)$ = New # of records.

$360-2x$ = new profit per record.

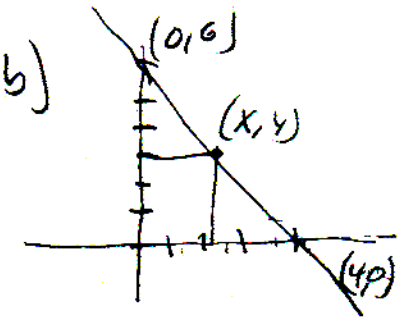
$P(x) = (100+x)(360-2x)$

$= 36000+160x-2x^2$

$-\frac{b}{2A} \rightarrow \frac{-160}{-2(2)}$

40. Should make 40 additional records for a total of 140 records.

b)



$3x+2y=12$

$y=-\frac{3}{2}x+6$

$(x, -\frac{3}{2}x+6)$

$A=lw$

$A(x) = (-\frac{3}{2}x+6)x$

$= -\frac{3}{2}x^2+6x$

$C \frac{-b^2}{4A} \rightarrow 0 - \frac{36}{-6}$

6

The max area of rectangle is 6 sq units.

11T

$x^2 + 6x + 8y - 31 = 0$

$y = -\frac{1}{8}x^2 - \frac{3}{4}x + \frac{31}{8}$

$y = -\frac{1}{8}(x^2 + 6x + 9) + \frac{31}{8} + \frac{9}{8}$

$y = -\frac{1}{8}(x+3)^2 + 5$

$c = 2 \quad V = (-3, 5) \quad f(-3, 3)$

$x^2 - 10x - 12y + 37 = 0$

$12y = x^2 - 10x + 25 + 12$

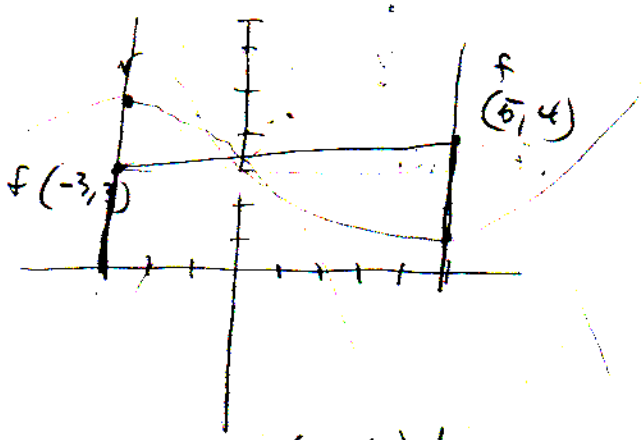
$y = \frac{1}{12}(x-5)^2 + 1$

$c = 3 \quad V = (5, 1) \quad f(5, 4)$

$d(f_1, f_2) = \sqrt{(4-3)^2 + (5+3)^2}$

$= \sqrt{1 + 64}$

$= \sqrt{65}$



$A_{TRAP} = \frac{1}{2}(b_1 + b_2)h$

$= \frac{1}{2}(3 + 4)(8)$

$= 28$

The Trapazaid has 28 sq units.

the Perimeter is

$\sqrt{65} + 8 + 3 + 4 = 15 + \sqrt{65}$

Extra

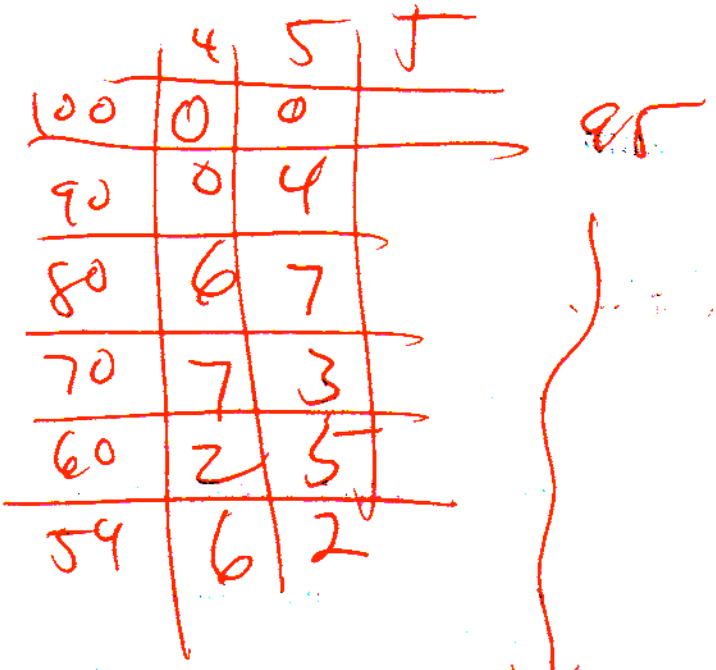
$x^4 - 10000 = 0$

$x^4 = 10000$

$x^2 = \pm 100$

$x \in \{\pm 10, \pm 10i\}$,

$(x^2 + 100)(x^2 - 100)$



95

1416 1594 3010

21 22 43

67.4 75.9 70.0

Honors Analysis

Name AnLCh 2

Per _____ Date 3/11/2000

Copy original problem.

Convince *me* that **you** understand the concept!

No decimals!

Chapter 2 Exam

I Solve for all x (including complex values, if any). Show ERRTS at work. Rewrite the equation in "factored form". No fractions (15 pts ea)

a) $15x^4 + 61x^3 + 57x^2 - 11x - 10 = 0$

b) $36x^4 - 108x^3 + 29x^2 + 48x - 20 = 0$

II Extreme value problems. Proper setup is very important. Your final answer must be a complete, meaningful sentence. (20 pts ea)

a) A small recording studio that produces its own records is able to press 100 records a day at a profit of $3.60 per record. If a more expensive process is used, production can be increased, but the profit per record diminishes by 2 cents per record for each additional record produced. How many additional records should be made in order to maximize total daily profits?

b) A rectangle with the 1st amendment has a side on the x-axis, one side on the y-axis. One vertex is at the origin. The one vertex which is not on either axis has coordinates (x, y) and is on the line: $3x + 2y = 12$.

1. Draw an axis and graph the line. label everything.
2. Draw a "typical rectangle" as described in the story above.
3. Write the coordinates of the "fourth vertex" in terms of only x instead of in x and y.
4. What is the maximum area which can be enclosed by the "typical rectangle"?

III Parabola, Lines, etc. (30 pts tot)

Given: $x^2 + 6x + 8y - 31 = 0$ and $x^2 - 10x - 12y + 37 = 0$.

A trapazoid is formed in the following fashion: A vertical line is drawn through each vertex. A line is drawn between both foci. The fourth line is the x-axis.

Determine the area and perimeter of the trapazoid formed by the 4 lines.

Extra Credit ---------- 5 pts ----------

Solve for *all* roots: $x^4 - 10000 = 0$.

I a) $6x^4 - 19x^3 - 37x^2 + 62x + 24 = 0$

1, 2, 3, 4, 6, 8, 12, 24

1, 2, 3, 6

$\pm\frac{1}{2}, \pm\frac{1}{3}, \pm\frac{1}{6}, \pm\frac{2}{1}, \pm\frac{2}{3}, \pm\frac{2}{6}, \pm\frac{3}{1}$

$\pm\frac{3}{2}, \pm\frac{3}{3}, \pm\frac{4}{1}, \pm\frac{4}{3}, \pm\frac{4}{1}, \pm\frac{4}{3}, \pm\frac{4}{6}$

$x \in \{\frac{3}{2}, -\frac{1}{3}, -2, 4\}$

	6	−19	−37	62	24
−1	6	−25	−12	74	−50
1	6	−13	−50	12	36
$\frac{3}{2}$	6	−10	−52	−16	0
$-\frac{1}{3}$	6	−24	−30	72	0
−2	6	−31	25	12	0
4	6	5	−17	−6	0

b) $18x^4 + 9x^3 + 70x^2 + 36x - 8 = 0$

1, 2, 4, 8

1, 2, 3, 6, 18

$\pm\frac{1}{2}, \pm\frac{1}{6}, \pm\frac{1}{9}, \pm\frac{1}{18}, \pm\frac{2}{3}, \pm\frac{2}{9}, \pm\frac{4}{3}, \pm\frac{4}{9}$

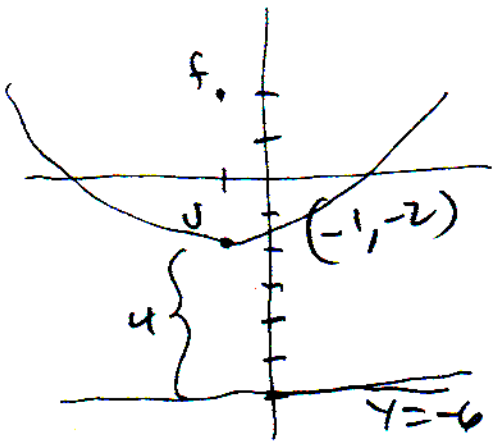
$\pm\frac{4}{6}, \pm\frac{8}{3}, \pm\frac{8}{9}$

$x \in \{\frac{1}{6}, -\frac{2}{3}, \pm 2i\}$

	18	9	70	36	−8
−1	18	−9	79	−43	35
1	18	27	97	133	125
$\frac{1}{6}$	18	12	72	48	0
$-\frac{2}{3}$	18	−3	72	−12	0

Tried/failed −4
Not tried −6

II a)



$y = \frac{1}{4 \cdot 4}(x+1)^2 - 2$

$y = \frac{1}{16}(x+1)^2 - 2$

$x = 0 \quad y = \frac{1}{16} - \frac{32}{16}$

$y = \frac{-31}{16}$ y intercept

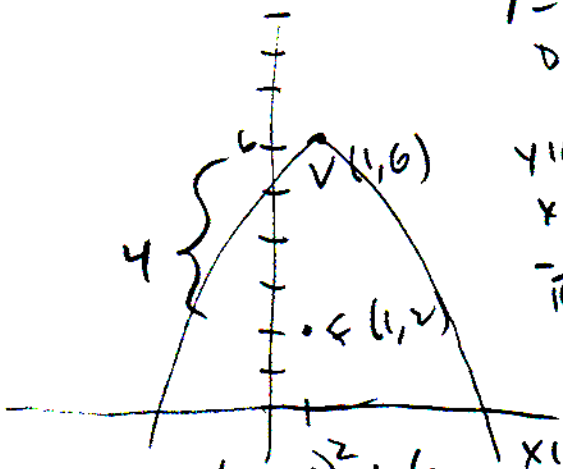
$(x+1)^2 = 32$

$x + 1 = \pm 4\sqrt{2}$

$x = -1 \pm 4\sqrt{2}$

x intercepts

b)



Y=10
directrix

y intercept
$x = 0$
$-\frac{1}{16} + 6$
$\frac{95}{16}$

$y = \frac{-1}{4 \cdot 4}(x-1)^2 + 6$

$= \frac{-1}{16}(x-1)^2 + 6$

x intercept
$y = 0$

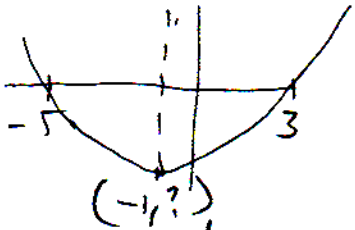
$(x-1)^2 = 96$

$x - 1 = \pm 4\sqrt{6}$

$x = 1 \pm 4\sqrt{6}$

NO x axis intercepts
−8

III



set $(x+5)(x-3) = 0$

$x^2+2x-15$

$(x^2+2x+1)-16$

$y=[(x+1)^2-16]$

#1 vertex $(-1,-16)$ any number here exactly same as x intercepts

#2 $\frac{1}{4}[(x+1)^2-16]$

$y=\frac{1}{4}(x+1)^2-4$

vertex $(-1,-4)$

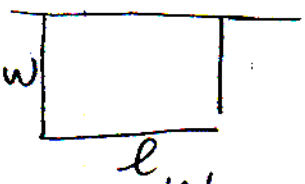
#3 $\frac{1}{16}[(x+1)^2-16]$

$y=\frac{1}{16}(x+1)^2-1$

vertex $(-1,-1)$

3rd one 8pts

IV



$A=lw$

let w = width

$2000-2w$ = length

$A(w) = w(2000-2w)$

$= 2000w-2w^2$

$C-\frac{b^2}{4a}$ $0-\frac{1000 \cdot 1000}{-2\cdot 4}$ $\frac{1000}{2000}$ $\frac{500}{1000}$

area 500,000

area enclosed is 100,000 sq ft.

The barn adds 20,200 sq ft.

$-\frac{b}{2a} = -6$ pts

let w = width

$x = w-40$

$w+l+x = 2000$

$w+l+w-40 =$

$2w+l=2040$

$l = 2040-2w$

$A=lw$

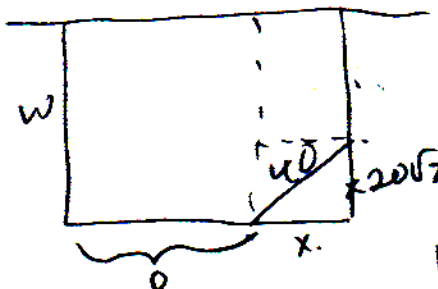
$A(w) = (2040-2w)w$

$= 2040w-2w^2$

$C-\frac{b^2}{4a}$ $0-\frac{10200 \cdot 5010}{-2\cdot 4}$ $\frac{10200}{20400}$ $\frac{5010}{20040}$

area enclosed 520200

Extra.



$2x^2 = 40^2 = 1600$

$x^2 = 800$

$x = 20\sqrt{2}$

$w+l+w-20\sqrt{2} = 2000$

$l = 2000+20\sqrt{2}-2w$

let w = width

$\text{area} = lw + \frac{1}{2}\cdot 800 + (20\sqrt{2})(w-20\sqrt{2})$

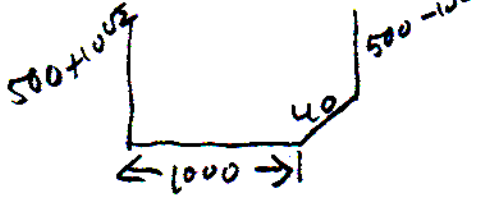
$= (2000+20\sqrt{2}-2w)w + 400 + 20\sqrt{2}w - 800$

$= 2000w + 20\sqrt{2}w - 2w^2 - 400 + 20\sqrt{2}w$

$= -400 + (2000+40\sqrt{2})w - 2w^2$

$-\frac{b}{2a}$ $+\frac{(2000+40\sqrt{2})}{+\cdot 2\cdot 2}$ $\frac{500+10\sqrt{2}}{}$

$w = 500+10\sqrt{2}$



This was a great exam!
No changes—
I can't seem to get the makeup ones to work—

96

100	1	0	1
90	6	2	8
80	7	5	12
70	6	3	9
60	4	5	9
59	0	3	3

24 18

1962 / 18 = 109

1275 / 18 = 70.8

3237 / 42 = 77.1

103 − 20 = 83

3/1/01

	4	5	t
100	0	2	2
90	3	5	8
80	2	7	9
70	7	4	11
60	4	4	8
59	4	3	7

1319 / 18 = 73.3

1944 / 24 = 81.0

103 − 33 = 70

77.7

Still a great exam.
I gave a quiz 2 days before writing at III. Most kids learn from it. MANY

Honors Analysis

Name Analysis Ch 2

Copy original problem.

Per _____ Date 1996 2001

Convince *me* that **you** understand the concept*!*

No decimals.

Chapter 2 Exam

I Solve for all values of x. Show RRTS at work. (15 pts ea)

a) $6x^4 - 19x^3 - 37x^2 + 62x + 24 = 0$

b) $18x^4 + 9x^3 + 70x^2 + 36x - 8 = 0$

II Write the equations of the parabola (in graphing form) which satisfies the given. Determine all axis intercepts. Sketch. (15 pts ea)

a) focus $(-1, 2)$

directrix $y = -6$

b) focus $(1, 2)$

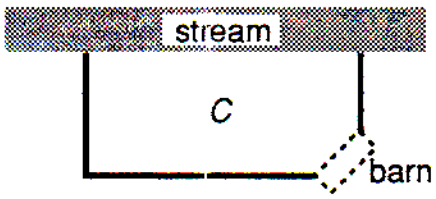
vertex $(1, 6)$

III There are an infinite number of parabolas which have x-intercepts -5 and 3. Write the equations in graphing form of 3 such parabolas. For each, identify coordinates of the vertex. Show that each of your parabolas do, indeed, have the proper x-intercepts. (15 pts)

IV Rancher, Ms. Barb Dwyer, has two thousand feet of fence material and plans to enclose the maximum area possible. She wants to know how much more area she can enclose if she also relocates a forty foot-long barn as shown in figure *B* . (25 pts)

Extra Credit ---------- 5 pts ----------

Ms. Dwyer is considering another arrangement. Barb thinks that she should relocate the barn so that it is on a 45 degree line in the corner. See figure *C*. What would be the dimensions which enclose the maximum area using this plan?



I 4) $12x^4 - 55x^3 + 45x^2 + 40x - 12$

$\pm \frac{1,2,3,4,6,12}{1,2,3,4,6,12}$

	12	-55	45	40	-12
-1	12	-67	112	-72	60
1	12	-43	2	42	30
$\frac{1}{4}$	12	-52	32	48	0
	3	-13	8	12	
$-\frac{2}{3}$	12	-63	87	-18	0
	4	-21	29	-6	
2	12	-31	-17	6	0
3	12	-19	-12	4	0

$\frac{1}{2}\ -\frac{1}{2}\ -\frac{1}{3}\ \frac{1}{4}\ -\frac{1}{6}\ \frac{2}{1}\ -\frac{2}{1}\ \frac{2}{3}\ -\frac{2}{3}\ \frac{1}{1}$

$\frac{1}{3}\ \frac{3}{2}\ -\frac{3}{2}\ -\frac{3}{4}\ \frac{4}{1}\ -\frac{4}{3}\ -\frac{4}{1}$

$x \in \{\frac{1}{4}, -\frac{2}{3}, 2, 3\}$

$(4x-1)(3x+2)(x-2)(x-3)$

B) $45x^4 - 102x^3 + 17x^2 + 16x - 4$

$\pm \frac{1,2,4}{1,3,5,15,45}$

	45	-102	17	16	-4
-1	45	-147	164	-148	144
1	45	-57	-40	-24	-28
					4.7
$-\frac{2}{5}$	45	-120	65	-10	0
	9	-24	13	-2	
$\frac{1}{3}$	45	-87	-12	12	0
	15	-29	-4	4	
2	45	-12	-7	2	0

$\frac{1}{3}, \frac{1}{3}, \frac{1}{5}, \frac{1}{15}, \frac{2}{1}, \frac{2}{11}, \frac{2}{5}$

$-\frac{4}{1}, -\frac{4}{15}, \frac{4}{5}, -\frac{4}{15}$

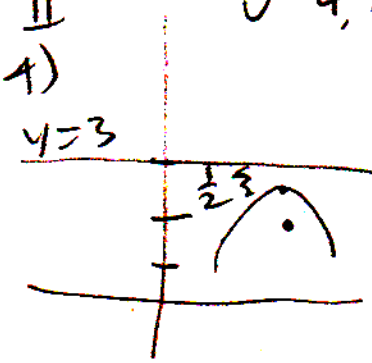
$x \in \{-\frac{2}{5}, \frac{1}{3}, \frac{1}{3}, 2\}$

$(5x+2)(3x-1)^2(x-2)$

Double Root.

II

U 4, 2



1) $y = \frac{1}{4p}(x-h)^2 + k$

$y = \frac{1}{4(-\frac{1}{2})}(x-4)^2 + \frac{5}{2}$

$y = -\frac{1}{2}(x-4)^2 + \frac{5}{2}$

$-2y = x^2 - 8x + 16 - 5$

$x^2 - 8x + 24y + 11 = 0$

B) $y = \frac{1}{8}x^2 - \frac{3}{4}x - \frac{7}{8}$

$= \frac{1}{8}(x^2 - 6x + 9) - \frac{7}{8} - \frac{9}{8}$

$= \frac{1}{8}(x-3)^2 - 2$

2 pts if omitted

V = (3, -2)

f = (3, 0)

dir: y = -4

y int $(0, -\frac{7}{8})$

$x^2 - 6x - 7 = 0$

$(x-7)(x+1)$

x int $(7, 0), (-1, 0)$

III (4, 3) (-4, -12)

$m = \frac{3+12}{4+4} = \frac{15}{8}$

$m = -\frac{3}{2}$

$y - 3 = -\frac{3}{2}(x-4)$

$y = -\frac{3}{2}x + 9$

x intercept $-y = 0$

$\frac{3}{2}x = 9\frac{2}{3}$

$x = 6$

$m = +\frac{2}{3}$ (6, 0)

$y - 0 = \frac{2}{3}(x-6)$

$y = \frac{2}{3}x - 4$

II

A)

$A(w) = w\left(\frac{1}{2}(240-3w)\right)$

$= 120w - \frac{3}{2}w^2$

$-\frac{b}{2a} \rightarrow \frac{-120}{-3} = 40$

$w = 40 \quad \frac{1}{2}(240-120)$

$l = 60$

The dimensions are 60 x 40

B) let x = 1st #

$x+1$ = 2nd

$x+2$ = 3rd

$f(x) = x^2 + (x+2)^2$

$= x^2 + x^2 + 4x + 4$

$= 2x^2 + 4x + 4$

$-\frac{b}{2a} \rightarrow \frac{-4}{4} = -1$

The 3 #s are $-1, 0, 1$.

C) Both functions were parabolas ∴ each has one and max or min. Part a has a max because $-\frac{3}{2}$ and part b has a min because of the 2. The methods were identical since I used $-\frac{b}{2a}$ to get the domain value of the vertex.

Let x = the income

$\frac{x}{100}$ = Percent of tax

$x\left(\frac{x}{100}\right)$ = $ Lost to tax

we want to maximize Take home T

Extra

$T(x) = x - x\left(\frac{x}{100}\right)$

$= x - \frac{x^2}{100}$

$-\frac{b}{2a} \quad -\frac{1}{-\frac{2}{100}} = 50$

The citizens should earn 50 rupee's a week.

	2	5	T
100	1	0	
90	4	4	
80	5	5	
70	4	3	
60	3	3	
54	3	3	

100

1616 / 21 = 77.0

1644 / 21 = 78.3

8266 / 42 = 197.6

Excellent exam.

Very well chosen problems.

2 $\frac{p}{q}$ phlms is right.

I want to produce better worksheets emphasizing writing fcts and solving, as well as a strenuous job on parabolas and lines.

Maybe a "Read directions" lesson would help.

another year of students with no alg skills ..... very tiring ....

	3	5	T
100	2	0	
90	2	3	
80	6	6	
70	3	8	
60	3	7	
54	1	2	

104 ↓ 54

100	1	105
90	9	↓
80	1	
70	2	
60	4	
59	8	30

73.92

1388/17 = 81.6

1947/26 = 74.9

3335/43 = 77.6

Excellent system. Slopes to calculator suffered no lid $y = mx + b$ problem. No changes!!

Honors Analysis Name ANL Ch 2

Copy original problem. Per _____ Date 9/02

Convince *me* that you understand the concept!

Chapter 2 Exam

I Solve for all x: (15 pts ea)

a) $12x^4 - 55x^3 + 45x^2 + 40x - 12 = 0$ b) $45x^4 - 102x^3 + 17x^2 + 16x - 4 = 0$

II Parabolas (15 pts ea)

a) Given the focus (4, 2) and the directrix $y = 3$, determine the equation of the parabola and write in the form of $ax^2 + bx + cy + d = 0$ where the letters $a, b, c,$ and d are integers and $a > 0$. Be *very* sure you justify your method.

b) Given $y = \frac{1}{8}x^2 - \frac{3}{4}x - \frac{7}{8}$. Using the method of "completing the square," determine the coordinates of the vertex and the focus as well as the equation of the directrix. Determine the coordinates of *all* axis intercepts.

III Given: a line passing through (4, 3) and (14, – 12).
Find the equation of the perpendicular line which has the same *x*-intercept. (10 pts)

IV Application problems (30 pts total)

a) Two hundred forty feet of fencing are to be used to enclose a rectangular plot of ground and to separate it into two parts by means of a fence parallel to one of its sides. What are the dimensions which will yield that maximum area?

b) Find three consecutive integers such that the sum of the squares of the first and third numbers is a minimum.

c) **Explain** how you know that you have the absolute maximum in part A and the absolute minimum in part B. **Explain** how your methods for solution to part A differed from your methods for solution for part B **and why**.

Extra Credit ---------- 5 pts ----------

The Czarina of Jakestan has decreed that the citizens pay numerically the same percent in income tax as they make in rupees per week. What is the optimal salary in Jakestan?

1) $\frac{P}{Q}$ is a rational root (and relatively prime) of : $F(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \cdots a_n = 0$

2) where $a_0, a_1, \cdots, a_n \varepsilon$ J then $P - MQ$ must divide $F(M)$

3) Simplified version : $P - Q$ must divide $F(1)$ and $P + Q$ must divide $F(-1)$.

PROOF :

4) Expand $F(x)$ in terms of $(x - M)$ to get : See example #4 pg 83. 2 things to notice: a_0 does not change. $F(M) = k_n$

5) $a_0(x - M)^n + k_1(x - M)^{n-1} + k_2(x - M)^{n-2} + \cdots + k_{n-1}(x - M) + k_n = 0$ where $k_i \varepsilon$ J

6) Since $x - M = 0$ when $x = M$, $F(M) = k_n$, Find $F\left(\frac{P}{Q}\right)$

7) $a_0\left(\frac{P}{Q} - M\right)^n + k_1\left(\frac{P}{Q} - M\right)^{n-1} + k_2\left(\frac{P}{Q} - M\right)^{n-2} + \cdots + k_{n-1}\left(\frac{P}{Q} - M\right) + k_n = 0$

8) $a_0\left(\frac{P - MQ}{Q}\right)^n + k_1\left(\frac{P - MQ}{Q}\right)^{n-1} + k_2\left(\frac{P - MQ}{Q}\right)^{n-2} + \cdots + k_{n-1}\left(\frac{P - MQ}{Q}\right) + k_n = 0$

9) $\frac{1}{Q^n}a_0(P - MQ)^n + \frac{1}{Q^{n-1}}k_1(P - MQ)^{n-1} + \frac{1}{Q^{n-2}}k_2(P - MQ)^{n-2} + \cdots + \frac{1}{Q}k_{n-1}(P - MQ) + k_n = 0$

10) $a_0(P - MQ)^n + Qk_1(P - MQ)^{n-1} + Q^2k_2(P - MQ)^{n-2} + \cdots + Q^{n-1}k_{n-1}(P - MQ) = -k_nQ^n$

11) $a_0(P - MQ)^{n-1} + Qk_1(P - MQ)^{n-2} + Q^2k_2(P - MQ)^{n-3} + \cdots + Q^{n-1}k_{n-1} = \frac{-k_nQ^n}{(P - MQ)}$

12) NOTE: The **left side** is the sum of integers, therefore the right side **MUST be an integer**!

13) $\frac{(P - MQ)}{Q} = \frac{P}{Q} - M$. Since $\frac{P}{Q}$ is relatively prime, so is $\frac{P}{Q} - M$ and $\frac{(P - MQ)}{Q}$.

14) AND so is $\frac{Q}{(P - MQ)}$ (since the reciprocal does not change common factors) and so is $\frac{Q^n}{(P - MQ)}$.

15) Conclusion : $P - MQ$ divides $-k_nQ^n$. Since $P - MQ$ does NOT divide Q^n, it MUST divide $-k_n$

16) Then $P - MQ$ must divide $F(M)$. For simplified use, let $M = \pm 1$ to yield :

17) $P - Q$ divides $F(1)$ AND $P + Q$ divides $F(-1)$

Solve for all roots over the complex numbers. Show the RRTS at work.

(1) $2x^5 - 11x^4 + 14x^3 - 2x^2 + 12x + 9 = 0$

(2) $12x^5 + 8x^4 + 11x^3 + 7x^2 - x - 1 = 0$

(3) $2x^3 - 3x^2 - x + 12 = 0$

(4) $2x^3 - 7x^2 - 21x + 54 = 0$

(5) $4x^4 - 12x^3 + x^2 + 14x - 3 = 0$

(6) $2x^5 - 11x^4 + 4x^3 + 53x^2 - 48x - 36 = 0$

(7) $12x^4 - 56x^3 + 59x^2 + 9x - 18 = 0$

(8) $3x^4 + 46x^3 - 30x^2 + 33x + 16 = 0$

(9) $16x^4 - 72x^2 + 81 = 0$

(10) $10x^4 - 27x^3 - 2x^2 + 44x - 24 = 0$

(11) $6x^4 - 35x^3 + 64x^2 - 15x - 50 = 0$

(12) $6x^4 + 13x^3 - 7x^2 - 26x - 10 = 0$

(13) $270x^2 - 453x + 287x - 40 = 0$

(14) $10x^4 - 130x^2 + 360 = 0$

(15) $24x^3 + 50x^2 - 29x - 10 = 0$

(16) $192x^4 + 40x^3 - 66x^2 + 9x = 0$

(17) $75x^3 - 10x^2 - 96x - 32 = 0$

(18) $12x^3 + 112x^2 + 343(x + 1) = 0$

(19) $128x^3 + 48x^2 - 200x - 75 = 0$

(20) $36x^4 - 24x^3 - 95x^2 + 75x = 0$

ERRTS (simplified) An Example:

Theorem: If $\frac{P}{Q}$ is a rational root (and relatively prime) of $F(x)$

then $(P-Q)$ divides $F(1)$ and $(P+Q)$ divides $F(-1)$.

Given: $F(x) = 24x^4 - 42x^3 - 77x^2 + 56x + 60 \overset{set}{=} 0$ $\quad \pm\left\{\frac{1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 10,\ 12,\ 15,\ 20,\ 30,\ 60}{1,\ 2,\ 3,\ 4,\ 6,\ 8,\ 12,\ 24}\right\}$

	24	−42	−77	56	60		
−1]	24	−66	−11	67	−7	$= F(-1)$	$\pm\left\{\frac{5}{4}, \frac{5}{6}, \frac{5}{8}, \frac{5}{12}, \frac{5}{24}, \frac{6}{1}, \frac{10}{1}, \frac{12}{1}, \frac{15}{1}, \frac{15}{2}, \frac{15}{4}, \frac{15}{8}, \frac{20}{1}, \frac{30}{1}, \frac{60}{1}\right.$
+1]	24	−18	−95	−39	21	$= F(1)$	$\left.\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \frac{1}{12}, \frac{1}{24}, \frac{2}{1}, \frac{2}{3}, \frac{3}{2}, \frac{3}{4}, \frac{3}{8}, \frac{4}{1}, \frac{4}{3}, \frac{5}{1}, \frac{5}{2}, \frac{5}{3}\right\}$

Step #1 of ERRTS: ADD and/or SUBTRACT denominator to/from numerator.

If either divides $F(-1)$, then it is a possible root. See example:

$\frac{1}{2} \rightarrow \frac{1+2=3 \text{ does NOT divide } -7}{1-2=-1 \text{ does divide } -7}$ $\quad -\frac{1}{2}$ is a possible root

because the result was found by *subtraction*

$\frac{1}{3} \rightarrow \frac{1+3=4 \text{ NO}}{1-3=2 \text{ NO}}$ $\frac{3}{4} \rightarrow \frac{3+4=7 \text{ YES}}{3-4=-1 \text{ YES}}$ $\pm\frac{3}{4}$ etc.

We make a list of all of our possibilities:

$$\left\{\frac{1}{6}, \frac{3}{4}, \frac{4}{3}, \frac{5}{2}, \frac{-1}{2}, \frac{-1}{8}, \frac{-2}{1}, \frac{-2}{3}, \frac{-3}{2}, \frac{-3}{4}, \frac{-4}{3}, \frac{-5}{4}, \frac{-5}{6}, \frac{-5}{12}, \frac{6}{1}, \frac{-10}{3}, \frac{-15}{8}\right\}$$

Step # 2 of ERRTS: SUBTRACT only the denominator from the numerator.

If the result divides $F(1) = 21$ then it is a possible root.

$\frac{1}{6} \rightarrow 1-6=-5$ NO $\quad \frac{3}{4} \rightarrow 3-4=-1$ YES

$\frac{-1}{2} \rightarrow -1-2=-3$ YES $\quad \frac{5}{2} \rightarrow 5-2=3$ YES etc. $\quad \rightarrow \left\{\frac{3}{4}, \frac{4}{3}, \frac{5}{2}, \frac{-1}{2}, \frac{-3}{4}, \frac{-4}{3}, \frac{-2}{1}\right\}$

	24	−42	−77	56	60	
$\frac{3}{4}$]	24	−24	−95	X		
$\frac{4}{3}$]	24	−10	X			
$\frac{5}{2}$]	24	18	−32	−24	0	**Root** other pos root must be irrational
	12	9	−16	−12		
$\frac{-1}{2}$]	12	3	X			
$\frac{-3}{4}$]	12	0	−16	0		**Root** Now I have a quadradic equation

$12x^2 - 16 = 0$

$3x^2 - 4 = 0$

$3x^2 = 4$

$x^2 = \frac{4}{3}$

$x = \pm\frac{2\sqrt{3}}{3}$

The roots of $F(x)$ are:

$$\left\{\frac{5}{2}, -\frac{3}{4}, \pm\frac{2\sqrt{3}}{3}\right\}$$

and the factors of $F(x)$ are:

$$(2x-5)(4x+3)\left(3x^2-4\right)$$

I

A) $x^2-6x-64y-23=0$

$16y = x^2-6x-23$

$16y = x^2-6x+9-32$

$y = \frac{1}{16}(x-3)^2-2$

B) $f=4$ vertex: $(3,-2)$

$\therefore$ focus $(3,2)$

C) $m=\frac{3}{4}$ $\quad y-2=\frac{3}{4}(x-3)$

$y=\frac{3}{4}x-\frac{9}{4}+\frac{8}{4}$

$y=\frac{3}{4}x-\frac{1}{4}$

D) $\frac{1}{16}(x-3)^2-2 \overset{\text{set}}{=} \frac{3}{4}x-\frac{1}{4}$

$(x-3)^2-32 = 12x-4$

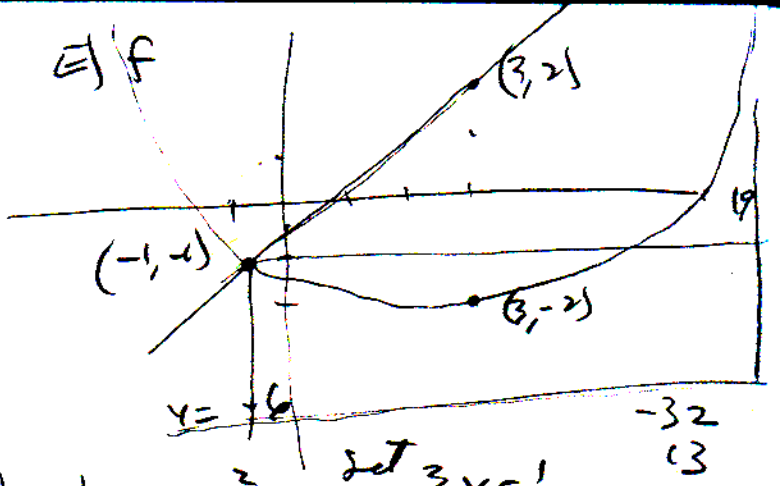
$x^2-6x+9-32 = 12x-4$

$x^2-18x-19=0$

$(x-19)(x+1)=0$

$x=\{19,-1\}$

$(19,14)$ $\quad (-1,-1)$



$\frac{3}{4}\cdot 19-\frac{1}{4}$

$\frac{57-1}{4}=\frac{56}{4}=14$

$\frac{3}{4}(-1)-\frac{1}{4}=-1$

II

a) $15x^4+61x^3+57x^2-11x-10=0$

$\pm\frac{1,2,5,10}{1,3,5,15}$

$\frac{1}{3}\ \frac{-1}{3}\ \frac{2}{5}\ \frac{-1}{5}\ \frac{2}{1}\ \frac{-2}{1}\ \frac{2}{3}$

$-\frac{2}{5}\ \frac{5}{1}\ \frac{-5}{1}\ \frac{5}{3}$

	15	61	57	-11	-10
-1	15	46	11	-22	12
1	15	76	133	122	112
$-\frac{2}{5}$	15	55	35	-25	0
	3	11	7	-5	
$-\frac{5}{3}$	15	36	-3	-6	0
	5	12	-1	-2	

4.28
4.4.7

$x=\{-\frac{2}{5}, -\frac{5}{3}, -1\pm\sqrt{2}\}$

$(5x+2)(3x+5)(x^2+2x-1)$

b) $6x^5-29x^4+40x^3-7x^2=12x$

$x(6x^4-29x^3+40x^2-7x-12)=0$

$\pm\{\frac{1,2,3,4,6,12}{1,2,3,5}\}$

$-\frac{1}{2}\ \frac{1}{3}\ \frac{-1}{4}\ \frac{1}{4}\ \frac{-2}{11}\ \frac{2}{1}\ \frac{-2}{8}\ \frac{3}{1}\ \frac{-3}{2}\ \frac{3}{2}$

$\frac{4}{11}\ \frac{-4}{11}\ \frac{4}{1}\ \frac{4}{3}\ \frac{-4}{15}$

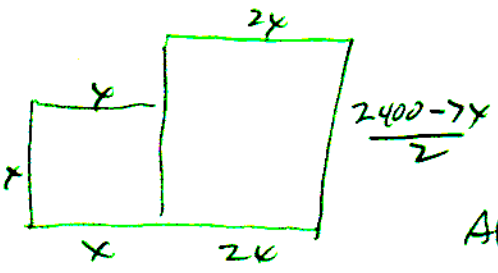
	6	-29	40	-7	-12
-1	6	-35	75	-82	70
1	6	-23	17	10	-2
$\frac{3}{2}$	6	-20	10	8	0
	3	-10	5	4	
$\frac{4}{3}$	6	-21	12	9	0

$x=\{0, \frac{3}{2}, \frac{4}{3}, 1\pm\sqrt{2}\}$

$x(2x-3)(3x-4)(x^2-2x-1)$

III

a)



Let x = side of square
$2x$ = width of Rect

$A = A_{sq} + A_{Rect}$

$A(x) = x^2 + 2x\left(\frac{2400-7x}{2}\right)$

$= x^2 + 2400x - 7x^2$

$= 2400 - 6x^2$

$c - \frac{b^2}{4a}$

$0 - \frac{600 \cdot 400}{4 \cdot (-6)}$

Max area is 240,000

b) Let x = 1st Number

$3 - x$ = 2nd Number.

$T = f^2 + 2nd$

$T(x) = x^2 + 3 - x$

$= x^2 - x + 3$

$c - \frac{b^2}{4a}$

$3 - \frac{1}{4} = \frac{11}{4}$

smallest total is $\frac{11}{4}$

c) Part a was because coefficient of x^2 is < 0. Part b was because coefficient of x^2 is > 0 The method for both did not. Like, both asked for extreme value which is given by $c - \frac{b^2}{4a}$

Extra

19th cent means 1800's

$40^2 = 1600$

$45^2 =$ 45 / 45 / 225 / 180 / 2025

$43^2 =$ 43 / 43 / 129 / 172 / 1849

DeMorgan was 43 in 1849 so he was born in 1806 (or if he had not had his birthday yet, he could have been born in 1805.

Could also be $44^2 = 1936$

Born in 1892 or 1893 since "he was alive in 19th century".

	2nd	3rd		
100	0	0	0	97
90	3	1	4	
80	1	1	2	
70	8	4	9	
60	4	5	9	
59	7	13	20	15

1301 / 20 = 65.1

1374 / 24 = 59.1

2660 / 43 = 61.9

$\frac{1}{2}$ flunked on alg II

EXAM.

There should be a pre requisite for this class!!

There are a Bunch who are totally clueless!

No changes required on this exam. III A was reworded from Before. This made improved the Problem.

Honors Analysis

Copy original problem.

Convince *me* that **you** understand the concept!

No Calculators!

Name AnL Ch 2

Per _____ Date 2003

Chapter 2 Exam

I Given: the parabola $x^2 - 6x - 16y - 23 = 0$ and the line through the focus of the parabola with slope three-fourths. Do **NOT** use decimal fractions. (40 pts total)
Remember to be very clear concerning your methods. ***Answer only is unacceptable.***

a) Re-write the equation of the parabola in graphing form (using the method of completing the square).

b) Determine the coordinates of the focus.

c) Determine the equation of the given line.

d) Determine the coordinates common to both the line and the parabola.

e) Sketch the parabola, the line through the focus and the directrix of the parabola on the same axis.

f) Draw vertical lines from the points found in part " d " to the directrix.

g) Find the area of the four-sided figure formed by the two lines drawn in step " f ", the directrix and the line with slope three-fourths.

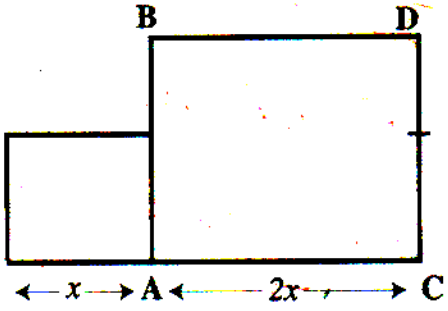
II Solve for all values x (including complex numbers). Show RRTS at work. **Write each equation in factored form** where the factors are either first degree or prime, second degree. (15 pts ea)
Do **NOT** use decimal fractions.

a) $15x^4 + 61x^3 + 57x^2 - 11x - 10 = 0$

b) $6x^5 - 29x^4 + 40x^3 - 7x^2 = 12x$

III Application. Be especially sure to use the proper set-up and answer the question asked using a complete sentence. Do **NOT** use decimal fractions. (30 pts total)

a) Two adjacent pens are to be constructed using 2,400 feet of fencing. The smaller pen is square and the other is rectangular. See the picture. What is the maximum area which can be enclosed? (hint: Notice that AB and CD are the same length. An expression for that length will be useful. Label each lenth of fence in the picture in terms of x.)



b) The sum of two positive numbers is three. What is the smallest total that can be made when the square of one of the numbers is added to the other number?

c) **Explain** how you know that you have the absolute maximum in part A and the absolute minimum in part B. **Explain** how your methods for solution to part A differed from your methods for solution for part B **and why**.

Extra Credit ---------- 5 pts ----------

Augustus De Morgan was alive during the nineteenth century and once wrote, "I was x years old in the year x^2. What was the year of his birth?

Honors Analysis Chapter 2 2003

NOTE: We use

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \textbf{and} \quad y - y_1 = m(x - x_1)$$

to

determine the equation of a straight line in graphing form:

$$y = mx + b$$

1 R/C Pg 55 - 59

#2 State Question and/or draw picture and state answer to oral ex pg 58-59

3 Pg 60-61
1 - 39 odd

2 / 14

School Holiday	#4 Pg 60 - 61 2 - 40 even, , 40 - 46 #5 R/C Pg 63 - 66 #6 Write Q & A for oral ex Pg 67 2 / 18	# 7 Pg 67 - 68 1 - 30 #8 Pg 62 47 B Be sure you make an "honors" effort on this! 2 / 19	# 9 Pg 78 - 79 3, 6, 12, 13, 15 - 17 2 / 20	# 10 Pg 74 23 - 27 # 11 Pg 79 18 - 23 # 12 Pg 68 33 2 / 21
# 13 "A Parabolic Trip Down Memory Lane." The set-up *is* most important! 2/ 24	# 14 Pg 104 - 105 1 - 5, 7 2/15	#15 Pg 85 13 - 18 Pg 92 1, 9, 10, 11 **"El Quizzo Extraordinaire"** 2 / 26	# 16 Pg 97 1, 2, 5 Pg 104 - 105 8 - 11 **also solve:** $24x^5 - 42x^4 - 77x^3 + 56x^2 + 60x = 0$ 2 / 27	**Important Lecture** Begin # 17 RRTS 1 - 5 2/28
# 18 RRTS 6 - 10 3 / 3	# 19 RRTS 11 - 15 3 / 4	# 20 RRTS 15 - 20 3 / 5	Put Last years Exam on chalk boards 3 / 6	EXAM CHAPTER 2 2003 3 / 7

A parabolic trip down Memory Lane

Set up properly by defining a variable, drawing a picture where possible, creating a second degree equation which describes the item to be maximized or minimized. Find the required value. State your conclusion using complete sentences.

1. Find two numbers whose sum is 10 and whose product is as great as possible.

2. Find the area of the rectangle of maximum area with perimeter 20 inches.

3. If an object is thrown upward with an initial velocity of 128 feet per second from an height above the ground of 20 feet, its height in feet above the ground after t seconds is given by: $h = 20 + 128t - 16t^2$. What is the maximum height attained by the object? When will it hit the ground?

4. If a stone is tossed upward with an initial velocity of 112 feet per second from a height of 700 feet above the surface of Mars, its height h in feet above the surface t seconds later is given by $h = -5.6t^2 + 112t + 700$. For what value of t will the stone be at its maximum height?

5. In a 110-volt circuit having a resistance of 11 ohms, the power W when a current I is flowing is given by $W = 110I - 11I^2$. Determine the maximum power that can be delivered in this circuit.

6. A real-estate operator estimates that the monthly profit p in thousands of dollars from a building is given by $p = -2s^2 + 88s$. What height would he consider most profitable?

7. A rectangular "Main" field is to be enclosed by a fence and divided into two smaller rectangular fields by another fence. Find the dimensions of the "Main" field of greatest area than can be thus enclosed and partitioned with twelve hundred feet of fencing.

8. A homesteader is offered as much land as he can enclose in a rectangular plot, one side of which is to lie along the straight bank of a river. Find the area of the largest such plot he can obtain if he has twenty-four hundred feet of fencing to use and does not fence the river side of his plot.

9. A fruit grower wishes to ship early in the season when prices are high and spoilage is low. He now has 15 tons on hand and estimates that he can add three tones per week by waiting. He gets three hundred dollars per ton now but estimates that this will reduce by twenty dollars per ton for each week he delays. When should he ship to maximize his revenue?

10. A helicopter shuttle service operating between an airport and the center of a city charges a fare of $10 and carries 300 persons per day. The manager estimates that he will lose 15 passengers for each increase of $1 in the fare. How much should the service charge in order to maximize its revenue?

Tomar Tu Casa Quizzo

Name_____

Analysis Chapter 2
Mr. Mumaugh

I Given: $f(x) = -\frac{1}{2}x^2 - x + 4$

a) Use the method of "completing the square" to put $f(x)$ into "graphing form".

b) Compute the coordinates of thethree axis intercepts.

c) Compute the equation for each of the three lines which pass through the focus of $f(x)$ and through an axis intercept.

II Find the coordinates of the focus of the parabola which has vertex at $(1, -2)$ and passes through the point $(3, 6)$.

Analysis
El Quizzzo
Mr. Mumaugh

Name _____

Per _____

Given: $f(x) = -\frac{1}{2}x^2 - x + 4.$

Compute the equation **for each of the *three* lines** which pass through the focus of f *AND* through an axis intercept of f.

I A) $10 \cdot 300 = 3000$/day

B) $G = NC$

5 C) $(300 - 15x)$

5 D) $G(x) = (10+x)(300-15x) = 3000 + 150x - 15x^2$

5 E) $c - \frac{b^2}{4a}$ $\quad 3000 - \frac{+150 \cdot +150}{-4 \cdot 15} = 3000 + 375 = 3375$

5 F) $\frac{-b}{2A} = \frac{-150}{-30} = 5$ $\quad 10 + 5 = 15$ best fare.

II

let x = increase

10 pts A)

$G(x) = (71+x)(7500-100x)$

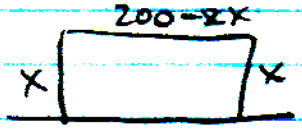
$= (71)(7500) + 400x - 100x^2$

$\frac{-b}{2A} \Rightarrow \frac{-400}{-200} = 2$ $\quad -5$ Stephanie

Best Price $73^{¢}$/gal.

only gives 2 cent increase -3

B) 10 pts.



$A(x) = x(200-2x)$

$= 200x - 2x^2$

$\frac{-b}{2A} \Rightarrow \frac{-200}{-4} = 50$

50 x 100 gives Largest area.

Both 50 x 100 and 5000 given as solutions -3

III $x^4 + 4x^3 + 8x^2 + 5x = 0$ $\quad x \in \{0, -1, \frac{-3 \pm i\sqrt{11}}{2}\}$

15 pts. A) $x(x^3 + 4x^2 + 8x + 5) = 0$

	1	4	8	5
-1	1	3	5	0

$x^2 + 3x + 5 = 0$

$\frac{-3 \pm \sqrt{9-20}}{2} = \frac{-3 \pm i\sqrt{11}}{2}$

B) $2x^3 - 3x^2 - x + 12 = 0$ $\quad \pm \{\frac{1, 2, 3, 4, 6, 12}{1, 2}\}$

	2	−3	−1	12
-1	2	−5	4	8 ←
1	2	−1	−2	10
−2	2	−7	13	−14 ←
$-\frac{3}{2}$	2	−6	8	0
	1	−3	4	

NEWLIST $\{-\frac{1}{2}, -2, 3, -3, -\frac{3}{2}\}$

only possibility $\{-\frac{3}{2}\}$

Root between also Lower Bound.

$x^2 - 3x + 4 = 0$ $\quad \frac{3 \pm \sqrt{9-16}}{2} = \frac{3 \pm i\sqrt{7}}{2}$

$x \in \{-\frac{3}{2}, \frac{3 \pm i\sqrt{7}}{2}\}$

c) $x^5+6x^4+10x^3-4x^2-24x-16=0$ $\pm\{\frac{1,2,4,8,16}{1}\}$

	1	6	10	−4	−24	−16	
−1	1	5	5	−9	−15	1	NEW List $\{+2,-2,\}$
−2	1	4	2	−8	−8	0	−3
−2	1	2	−2	−4	0		
−2	1	0	−2	0			

$x \in \{-2,-3,-2,\pm\sqrt{2}\}$

$x^2=2 \Rightarrow x=\pm\sqrt{2}$

$x \in \{-3,\pm\sqrt{2}\}$

d) $x^5+x^4-5x^3-5x^2+6x+6=0$ $\pm\{1,2,3,6\}$

	1	1	−5	−5	6	6	
−1	1	0	−5	0	6	0	

$x^4-5x^2+6=0$

$x^2=\frac{5\pm\sqrt{25-24}}{2}$

$x^2=\frac{5\pm1}{2}$ $\quad x^2=3$ or $x^2=2$

$x=\pm\sqrt{3}$ $\quad x=\pm\sqrt{2}$

5 pts

$x \in \{-1,\pm\sqrt{3},\pm\sqrt{2}\}$

+ 5 pts for attempt

+ 5 for all 5 solutions.

Extrem.

(x_0,y_0)

$(-1,3)$

$\frac{+6}{8}=\frac{+3}{4}=m \Rightarrow y=+\frac{3}{4}x+6$

$3x+4y-24=0$ +1

$\frac{|Ax_0+By_0+C|}{\sqrt{A^2+B^2}} \Rightarrow \frac{|+3+12-24|}{5}=\frac{9}{5}=+1$

$(x+1)^2+(y-3)^2=\frac{81}{25}$ +1

$x^2+2x+1+y^2-6y+9=\frac{81}{25}$

$\begin{array}{r} 250 \\ -\ 81 \\ \hline 169 \end{array}$

$25x^2+25y^2+50x-150y+169=0$ +2

(open).

103
100

94
90

86 -2
83 -2
80 -2

79
76
75 -2
74

69
68

57

March 1978

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Excellent Exam.

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ANALYSIS CHAPTER 2

NAME KEY 78

PER DATE 79

I A helicopter service operating between an airport and the center of the city charges a fare of $10 per person and carries 300 persons per day.

a) Gross income (G) in this business is defined to be the number of people, (x) multiplied times the cost each, (c). How much gross income does the helicopter service currently have?

b) Write the formula which defines gross income for this service.

c) The manager says that he will lose 15 passengers for every $1 increase in fare. Let x equal the increase in the per person fare. Then the new price per person would be (10 +x). Represent the new number of passengers in a like manner. (5 pts)

d) Write the formula which represents the gross income of the service at the increased rate. (clear all parentheses and combine like terms). (5 pts)

e) Determine the maximum gross income possible. (5 pts)

f) Determine best fare(from the manager's point of view). (5 pts)

II

a) At a certain service station, an average of 7500 gallons of gasoline are sold daily at 71¢ per gallon. The owner estimates that he will sell 100 gallons less per day for every 1¢ increase in price per gallon. Find the price which will give the owner maximum daily receipts. (10 pts)

b) A rectangular field is enclosed on three side by a fence of 200 ft total length. Find the dimensions of the field of maximum area. (the fourth side borders on the river therefore no fence needed there) (10 pts)

III Solve for all values of x. List all roots as many times as their multiplicity. eg. If 2 is a root 3 times, you will list it 3 times. (15 pts ea)

a) $x^4 + 6x^3 + 8x^2 + 5x = 0$

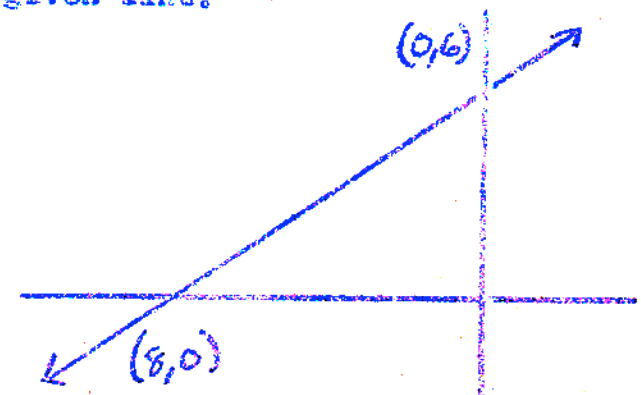
b) $2x^3 - 3x^2 - x + 12 = 0$

c) $x^5 + 6x^4 + 10x^3 - 4x^2 - 24x - 16 = 0$

d) $x^5 + x^4 - 5x^3 - 5x^2 + 6x + 5 = 0$

IV EXTRA 5 pts

Find the equation of the circle with center (-1,3) and tangent to the given line.



I

A) $3x^3-2x^2+2x+1=0$

	3	−2	2	1
$-\frac{1}{3}$	3	−3	3	0
	1	−1	1	

$x^2-x+1=0$

$x=\frac{1\pm\sqrt{1-4}}{2}$

$x=\frac{1\pm i\sqrt{3}}{2}$

$\frac{1}{1,3,3,4,6,12}$

New List $-\frac{1}{2}, 1, -\frac{1}{3}$

$x\in\left\{-\frac{1}{3}, \frac{1\pm i\sqrt{3}}{2}\right\}$

B) $12x^5+8x^4+11x^3+7x^2-x-1=0$

	12	8	11	7	−1	−1
−1	12	−4	15	−8	7	−8
1	12	20	31	38	37	36
$-\frac{1}{2}$	12	2	10	2	−2	0
	6	1	5	1	−1	
$-\frac{1}{2}$	6	−2	6	−2	0	
$\frac{1}{3}$	3	−1	3	−1		
	3	0	3	0		
	1	0	1			

$x^2+1=0 \quad x=\pm i$

$\frac{1,2,3,4,6,12}{1,2,3,6}$

$-2, \pm\frac{2}{3}, -\frac{1}{3}, \pm\frac{1}{2}$

too many.

$x\in\left\{-\frac{1}{2}, -\frac{1}{2}, \frac{1}{3}, \pm i\right\}$

C) $6x^4-29x^3+40x^2-7x-12=0$

	6	−29	40	−7	−12
−1	6	−35	75	−82	70
1	6	−23	17	−10	−2
$\frac{3}{2}$	6	−20	−10	8	0
	3	−10	5	4	
$\frac{4}{3}$	3	−6	−3	0	
	1	−2	−1		

x^2-2x-1

$x=\frac{2\pm\sqrt{4+4}}{2}$

$\frac{2\pm 2\sqrt{2}}{2}$

$x\in\left\{\frac{3}{2}, \frac{4}{3}, 1\pm\sqrt{2}\right\}$

D) $3x^4-6x^3+7x^2-8x+4=0$

$\frac{1,2,4}{1,3}$

	3	−6	7	−8	4
−1	3	−9	16	−24	28
1	3	−3	4	−4	0
1	3	0	4	0	

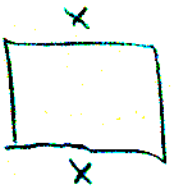
$3x^2+4=0$

$x^2=-\frac{4}{3}$

$x=\pm\frac{2i\sqrt{3}}{3}$

$x\in\left\{1, 1, \pm\frac{2i\sqrt{3}}{3}\right\}$

II A)



$A = x\left(\frac{1}{2}(2-2x)\right)$

$A = \frac{1}{2}x2 - x^2$

$\frac{-b}{2A} \Rightarrow \frac{-\frac{2}{2}}{-2} = \frac{2}{4}$

the rectangle is a square w/ sides $\frac{2}{4}$. Answer w/out Algebra - 8

B) Let x = # of 5¢ increases.

$P = (20+5x)(8000-800x)$

$P = 160{,}000 + 24000x - 4000x^2$

fare should be increased

40000
16000
24

$\frac{-24000}{-8000} = 3$

3.5 = 15¢ fare should be 35-0.

III $f(x) = 2 - 4x - 3x^2$

$f(x) = A(x-h)^2 + k$

$\frac{+4}{2\cdot 3} = \frac{2}{3}$

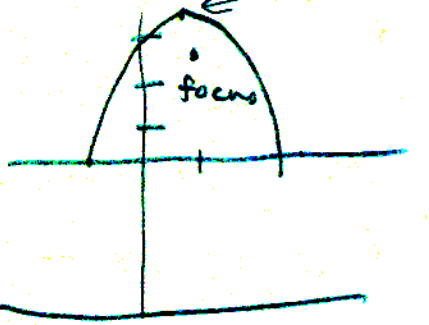
$= -3\left(x-\frac{2}{3}\right)^2 + \frac{10}{3}$

$c - \frac{b^2}{4A}$

$2 + \frac{16}{12}$

vertex $\left(\frac{2}{3}, \frac{10}{3}\right)$

directrix $2 + \frac{4}{3}$



$\frac{1}{4p} = -3 \therefore p = -\frac{1}{12}$

focus $\left(\frac{2}{3}, \frac{10}{3} - \frac{1}{12}\right)$ $\left(\frac{2}{3}, \frac{39}{12}\right)$

directrix $y = \frac{10}{3} + \frac{1}{12} = \frac{41}{12} = y$

EXTRA

(0,6) (8,0) $\Rightarrow$ $y = -\frac{3}{4}x + 6$

$\frac{6}{-(-8)} = -\frac{3}{4}$

$4y + 3x - 24 = 0$

$\sqrt{a^2+b^2} = \sqrt{9+16} = 5$

$\frac{4}{5}y + \frac{3}{5}x - \frac{24}{5} = 0$ Normalized

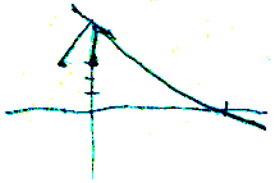
$(x_0, y_0) = (-1, 3)$

$\frac{|Ax_0 + By_0 + C|}{\sqrt{A^2+B^2}} = \frac{|3(-1) + 4(3) - 24|}{5} = \frac{|-3+12-24|}{5} = |-\frac{15}{5}| = 3$

$-\frac{27}{2}$

$\therefore (x+1)^2 + (y-3)^2 = 3^2$

$x^2 + 2x + y^2 - 6y + 1 = 0$



3-06-80 #

Excellent exam.
Make those changes indicated on the front of this sheet.

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Honors Analysis Chapt 2 NAME Key 1980

I Solve $\forall x \in \mathbb{C}$ (15pts ea) (Indicate ANY multiplicity)

A) $3x^3-2x^2+2x+1=0$ B) $12x^5+8x^4+11x^3+7x^2-x-1=0$

C) $6x^4-29x^3+40x^2-7x-12=0$ D) $3x^4-6x^3+7x^2-8x+4=0$

II Given a rectangle with Perimeter "z", find the
A) Dimensions which Yield maximum Area. (10pts)
(ii Prove the rectangle must be a square)

B) A Bus company charging a 20 cent fare carries 8000 riders daily. The owner determins they will lose 800 riders for each 5¢ fare increase. What fare Yields maximum Profits? (20pts)

III Sketch $f(x)=2-4x-3x^2$. Identify the vertex and its coordinates. State coordinates of the foci and the equation of the directrix. (10pts)

EXTra Credit

Find the equation of the circle with center at $(-1,3)$ and tangent to the line passing through $(0,6)$ and $(8,0)$. Your final answer should have integral coefficients and be set = to zero.

I

A) $x^4+4x^3+8x^2+5x=0$

$x(x^3+4x^2+8x^2+5)=0$

	1	4	8	5
-1	1	3	5	0

$x=\frac{-3\pm\sqrt{9-20}}{2}$

$x=\frac{-3\pm i\sqrt{11}}{2}$

$x\in\left\{0,-1,\frac{-3\pm i\sqrt{11}}{2}\right\}$

B) $x^5+6x^4+10x^3-4x^2-24x-16=0$

$\pm\{1,2,4,8,16\}$

	1	6	10	-4	-24	-16
-1	1	5	5	-9	-15	1
-1	1	7	17	13	-11	-27
-2	1	4	2	-8	-8	0
-2	1	2	-2	-4	0	
-2	1	0	-2	0		

New list $\{\pm 2\}$

$x^2=2$

$x\in\{-2,-2,-2,\pm\sqrt{2}\}$

C) $\frac{2}{3}x^2+\frac{5}{6}x-\frac{2}{3}=0$

$6x^2+5x-6=0$

$(3x-2)(2x+3)$

$x\in\left\{\frac{2}{3},-\frac{3}{2}\right\}$

D) $2x^3-3x^2-x+12=0$

$\frac{1,2,3,4,6,12}{1,2}$

	2	-3	-1	12
-1	2	-5	4	8
1	2	-1	-2	10
$-\frac{3}{2}$	2	-6	8	0
	1	-3	4	

New list $-\frac{1}{2},-2,3,-3,\frac{3}{2}$

only pos $\left\{\frac{3}{2}\right\}$

$x=\frac{3\pm\sqrt{9-16}}{2}$

$x\in\left\{-\frac{3}{2},\frac{3\pm i\sqrt{7}}{2}\right\}$

E) $x^5+x^4-5x^3-5x^2+6x+6=0$

	1	1	-5	-5	6	6
-1	1	0	-5	0	6	0

x^4-5x^2+6 let $x^2=z$

$z^2-5z+6=0$

$(z-3)(z-2)=0$

$z=3 \quad z=2$

$x^2=3 \quad x^2=2$

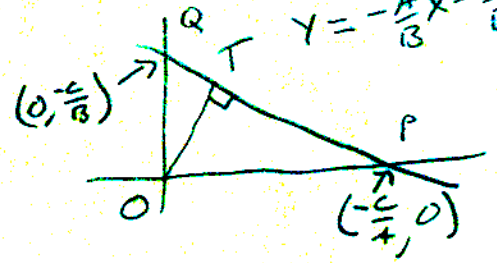
$x\in\{-1,\pm\sqrt{3},\pm\sqrt{2}\}$

II

$Ax+By+C=0$

$Ax=-C$

$x=-\frac{C}{A}$



$\frac{\overline{OT}}{\overline{OP}}=\frac{\overline{OQ}}{\overline{PQ}}=\frac{\text{side opp } \angle P}{\text{hyp}}$

$\overline{PQ}=\sqrt{\frac{C^2}{A^2}-\frac{C^2}{B^2}}$

$\frac{\overline{OT}}{-\frac{C}{A}}=\frac{-\frac{C}{B}}{\sqrt{\frac{C^2}{A^2}+\frac{C^2}{B^2}}}$

$\overline{OT}=\frac{\frac{C^2}{AB}}{\frac{|C|\sqrt{A^2+B^2}}{AB}}=\frac{|C|}{\sqrt{A^2+B^2}}$

III $f(x) = 2 - 4x - 3x^2$ $\left(\frac{-b}{2A}, c - \frac{b^2}{4A}\right)$

$\left(\frac{4}{-6}, 2 + \frac{16}{12}\right)$

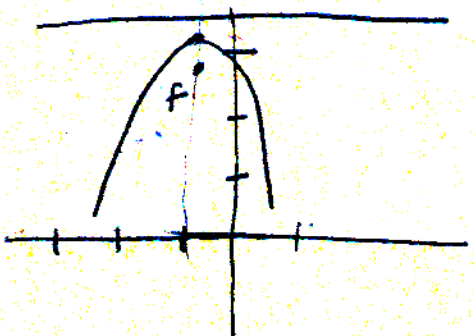
$f(x) = -3\left(x + \frac{2}{3}\right)^2 + \frac{10}{3}$

$\left(-\frac{2}{3}, \frac{10}{3}\right)$

$\frac{1}{4p} = -3$

$\therefore p = -\frac{1}{12}$

Vertex
Also Max



$\frac{10}{3} - \frac{1}{12} = \frac{39}{12} = \frac{13}{4}$

$\left(-\frac{2}{3}, \frac{13}{4}\right)$ = Focus

$\frac{10}{3} + \frac{1}{12} \Rightarrow \frac{41}{12} = y$ equation Directrix

IV

$A = x\left(\frac{1}{2}(2-2x)\right)$

$A = \frac{1}{2}2x - x^2$

$\frac{-b}{2A} = \frac{-\frac{1}{2}2}{-2} = \frac{2}{4}$

This is $\frac{1}{4}$ of Perim. $\therefore$ its a Sq.
This yields max because A is a parabola and it has only one max and it occurs when $x = \frac{-b}{2A}$

V Let x = increase ($1 $)

$G(x) = (71+x)(7500-100x)$

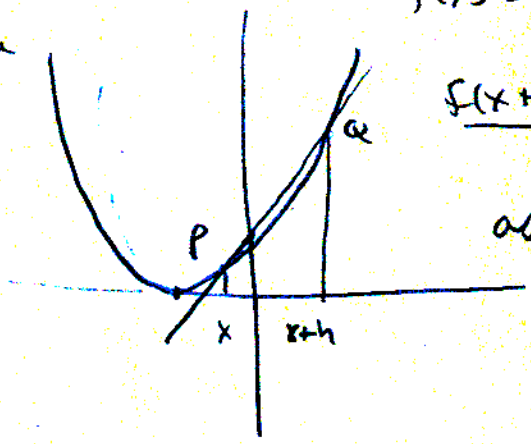
$= 71(7500) + 400x - 100x^2$

$\frac{-400}{-200} = 2$

Price should have been $71+2 = $73 $.

Extra

$f(x) = x^2 - 1$



$\frac{f(x+h) - f(x)}{h}$ is the slope of the chord PQ

as h gets smaller we approach the slope of the tangent line to f(x) at x.

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3/2/81

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89-2
87 5
85
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77 4
70-2
69 2
66
48 1

$81.84 = \frac{1555}{19}$

ANALYSIS (HONORS) CHAPT 2 EXAM NAME Key 1984

I Solve $\forall x \in \mathbb{C}$ (10 pts ea)

a) $x^4+4x^3+8x^2+5x=0$ B) $x^5+6x^4+10x^3-4x^2-24x-16=0$

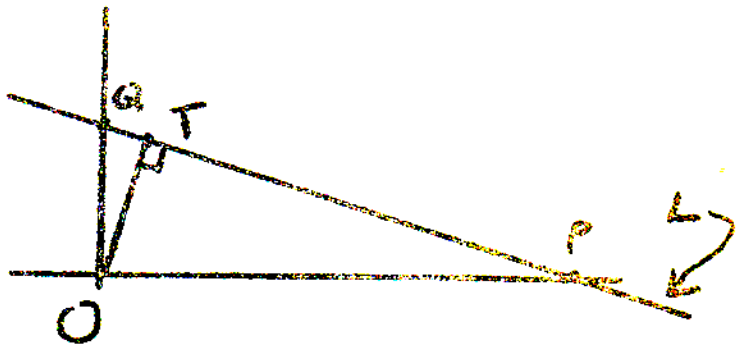
c) $\frac{2}{3}x^4+\frac{5}{3}x-\frac{2}{3}=0$ b) $2x^3-3x^2-x+12=0$

e) $x^5+x^4-5x^3-5x^2+6x+6=0$

II Given line L has the equation $Ax+By+C=0$. Show that the shortest DISTANCE (ie ⊥) from the origin to the line L is given by:

$$\frac{|C|}{\sqrt{A^2+B^2}}$$

(10 pts)



III Sketch $f(x)=2-4x-3x^2$ on your picture locate and identify the vertex, focus, and the directorix. Specifically state the coordinates of the vertex, focus, any extremum. Also state the equation of the directorix. (15 p

IV Given a rectangle with perimeter 2, prove that the shape which yields maximum max area is a square. Explain your solution. Explain why you know this is the best shape. (15 pts)

V At a certain gas station (many many years ago), gas sold for 71¢ a gallon. The owner knew that he would lose 100 gallons per day for each 1¢ raise in price. Back then he sold an average of 7500 gallons per day. What should have been price of gas that would have yielded the highest profits? (10 pts)

EXTRA extra EXTRA extra 5 pts

Given $f(x)=x^2-1$. Show and explain the geometric meaning of $\frac{f(x+h)-f(x)}{h}$

Also, if the value of h is allowed to get smaller and smaller (toward 0) (but never actually getting to zero) what would be the geometric meaning of: $\frac{f(x+h)-f(x)}{h}$?

Pts

100 1

92 -3 4
90

87
86 -3
83 -2 8
82
81

75
73
72 3

69
65 4
62
60

59
49 2

1724 / 22 = 78.36

82

96
94
93 -3 8
92
91
90

89
88
86 4
85

78 -2

75
74 6
71
70

67 1
57

1665 / 20 = 83.0

100↑	1	0	1
80↑	4	8	12
80↑	8	4	12
70↑	3	6	9
60↑	4	1	5
50↓	2	1	3

22 20

78.4 83.0 80.6

∠91 Variations

∠81 HW Diff

Excellent effort—
only change is number of
more trials.

Need to emphasize
that $f(x) = \frac{1}{8}x^2$ ...
and $f(x) = x^2$ are not equal.

ANALYSIS CHAPTER 2

NAME Key 1982

PER_____

I Solve $\forall X \in \mathbb{C}$ Indicate any multiplicities (15 pts ea)

A) $3X^3 - 2X^2 + 2X + 1 = 0$

B) $12X^5 + 8X^4 + 11X^3 + 7X^2 - X = 1$

C) $6X^4 - 29X^3 + 40X^2 - 7X - 12 = 0$

D) $3X^5 - 6X^4 + 7X^3 - 8X^2 + 4X = 0$

II A bus company charging a 20 cent fare carries 8000 riders daily. The owner determined that the company will lose 800 riders for each 5 cent fare increase. What fare yields maximum profits? (15 points)

III Given a rectangle with perimeter $\mathbb{P}$, prove that the rectangle (to contain maximum area) must be a square. Explain your rational very clearly (10 pts)

IV Make a fairly accurate sketch of the function. On your picture locate and identify (by coordinate or equation as appropriate) the directorix, the vertex, and the focus. Use the method of COMPLETING THE SQUARE to put the function in "graphing form". (15 points)

* Indicate the exact coordinates of any intercepts.

GIVEN : $F(x) = \frac{1}{8}x^2 - \frac{3}{4}x - \frac{7}{8}$

EXTRA CREDIT———— 5 PTS ————

Find the equation of the circle with center at the origin which is tangent to a line which passes through coordinates (0,6) and (8,0). Remove any ( ) and write in STANDARD form.

III

$A(L) = \frac{L(z-2L)}{2}$

$= \frac{z}{2}L - L^2$

$z = 2L + 2W$

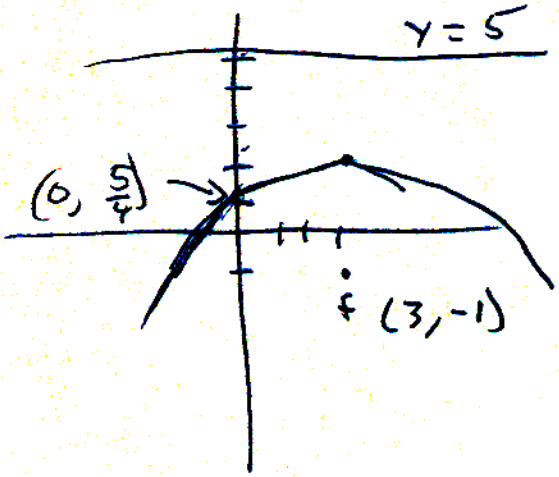
$\frac{-\frac{z}{2}}{-2} = \frac{z}{4}$

$\frac{z-2L}{2} = w$

Since both sides $= \frac{z}{4}$ this is a square (a rectangle w/ equal sides)

$\frac{z-2\cdot\frac{z}{4}}{2} = w$

$\frac{z-\frac{z}{2}}{2} = \frac{\frac{z}{2}}{2} = \frac{z}{4} = w$



open up -3

IV $f(x) = \frac{-1}{12}x^2 + \frac{1}{2}x + \frac{5}{4}$

$\frac{-1}{12}(x^2 + 6x + 9) + \frac{5}{4} + \frac{3}{4}$

$-\frac{1}{12}(x-3)^2 + 2$

$-\frac{1}{4\cdot 3}$

$24 = (x-3)^2$

$\pm 2\sqrt{6} = x - 3$

$3 \pm 2\sqrt{6} = x$

Extra $x^4 - 5x^2 + 6 = 0$

Let $y = x^2$ $y^2 - 5y + 6 = 0$

$(y-2)(y-3) = 0$

$x^2 - 2 = 0$ $x^2 - 3 = 0$

$x = \pm\sqrt{2}$ $x = \pm\sqrt{3}$

$x \in \{\pm\sqrt{2}, \pm\sqrt{3}\}$

	5	6	T
100↑	1	2	3
90↑	8	9	17
80↑	5	2	7
70↑	3	3	6
60↑	3	2	5
59↓	0	3	3
	20	21	41
	87.8	79.0	81.85

101

53

good exam

I deducted 2-5 usually if the I values weren't done correctly depending if student showed ERRTS work like.

3/5/83

Analysis ch 2.

Ch 2

ANALYSIS CHAPTER 2 NAME Key 1983

PER 3/4/83

I Solve $\forall X \in \mathbb{C}$ Indicate any multiplicities (Points are earned for work shown as well as for solutions) (15 pts ea)

A) $2X^5 - 11X^4 + 14X^3 - 2X^2 + 12X + 9 = 0$ B) $16X^4 - 18X^3 - 41X^2 + 20X + 12 = 0$

C) $4X^2(2X - 9) = 27(1 - 2X)$ D) $12X^4 + 4X^3 - 29X^2 + 20X = 4$

II A helicopter service company operating between an airport and the center of the city charges a fare of \$10 per person and carries 300 passengers per day. The owner estimates that he would lose 15 passengers per day for each \$1 increase in fare. Determine the fare which will yield maximum profits for the service company. Explain how you know that your answers is, indeed, THE ONLY maximum. (15 points)

III Given a rectangle with perimeter Z, prove that the rectangle (to contain maximum area) must be a square. Explain your rational very clearly (10 pts)

IV Make a fairly accurate sketch of the function. On your picture locate and identify (by coordinate or equation as appropriate) the directorix, the vertex, and the focus. Use the method of COMPLETING THE SQUARE to put the function in "graphing form". (15 points)

GIVEN: $F(X) = \frac{-1}{12}X^2 + \frac{1}{2}X + \frac{5}{4}$

EXTRA CREDIT ——— 5 PTS ———

Solve for all $X \in \mathbb{C}$.

$$X^4 + 6 = 5X^2$$

I A $2x^5+3x^4-4x^3-30x^2-25x=0$

	2	3	−4	−30	−25
−1	2	1	−5	−25	0
−1	2	−1	−4	−21	
1	2	3	−2	−27	
5/2	2	6	10	0	
	1	3	5		

$1, 5, 25$ / $1, 2$

$\left\{\frac{5}{2}, -\cancel{1}, \frac{1}{2}, \frac{-1}{2}\right\}$

20 pts

$x = \frac{-3 \pm \sqrt{9-20}}{2}$

$x \in \left\{0, -1, \frac{5}{2}, \frac{-3 \pm i\sqrt{11}}{2}\right\}$

B) $2x^3-3x^2-x+12=0$

	2	−3	−1	12
−1	2	−5	4	8
1	2	−1	−2	10
−3/2	2	−6	8	0
	1	−3	4	

$1, 2, 3, 4, 6, 12$ / $1, 2$

$\left\{-\frac{1}{2}, -\cancel{2}, \pm 3, \frac{-3}{2}\right\}$

20 pts

$x^2-3x+4=0$

$x = \frac{3 \pm \sqrt{9-16}}{2}$

$x \in \left\{-\frac{3}{2}, \frac{3 \pm i\sqrt{7}}{2}\right\}$

C) $48x^3+100x^2-58x-20=0$

	48	100	−58	−20
⟹	24	50	−29	−10
−1	24	26	−55	45
1	24	74	45	35
2/3	24	66	−15	0
	8	22	5	

$1, 2, 4, 5, 10, 20$ / $1, 2, 3, 4, 6, 8, 12, 16, 24, 48$

$\left\{\frac{2}{3}, \cancel{-\frac{2}{3}}, -5, \cancel{-\frac{5}{4}}, \cancel{-\frac{5}{3}}, \cancel{-\frac{5}{2}}, \cancel{\frac{5}{4}}, -\frac{1}{4}\right\}$

−1 each correct but didn't work

−2 for each correct not listed

$x \in \left\{\frac{2}{3}, -\frac{1}{4}, -\frac{5}{2}\right\}$

20 pts

$-\frac{22 \pm \sqrt{484-160}}{16}$

$\frac{-22 \pm 18}{16}$ $\quad -\frac{11 \pm 9}{8}$ $\quad -\frac{20}{8}$

$-\frac{2}{8}$ $\quad \frac{20}{8}$

	48	100	−58	−20
2/3	48	132	30	0
−1/4	48	88	−80	0
−5/2	48	−20	8	0

I D $6x^4+13x^3-7x^2-26x-10=0$ 1, 2,

Deleted

	6	13	-7	-26	-10
-1	6	7	-14	-12	2
1	6	19	12	-14	-24
$-\frac{1}{2}$	6	10	-12	-20	0
	3	5	-6	-10	
$-\frac{5}{3}$	3	0	-6	0	

$\{-\frac{1}{2}, -\frac{1}{3}, -\frac{2}{3}, -\frac{5}{3}, -\frac{5}{6}\}$

$3x^2-6=0$

$x^2=2$

$x\in\{\frac{-1}{2}, \frac{-5}{3}, \pm\sqrt{2}\}$

II #065

Let x = increase

New cost = $20+5x$

New # of rides = $8000-800x$ -3

$P(x)=(20+5x)(8000-800x)$

$=20\cdot8000+40000x-4000x^2-16000x$

$24000x$

$-\frac{b}{2A} \Rightarrow \frac{-24000}{-8000}=3$

3 increases = 15¢

But fare is 35¢

10 pts

III

A) $m=\frac{3}{2}$ x int $=\frac{2}{3}$

$y=\frac{3}{2}(x-\frac{2}{3})$

$y=\frac{3}{2}x-1$ 5pts

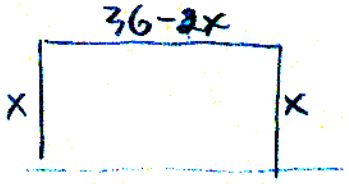
B) (1, 30) (-1, 22)

$\frac{30-22}{1+1}=\frac{8}{2}=4=m$

$y-30=4(x-1)$

$y=4x+26$ 5pts

IV



$A(x)=x(36-2x)$ 10pts

$36x-2x^2$

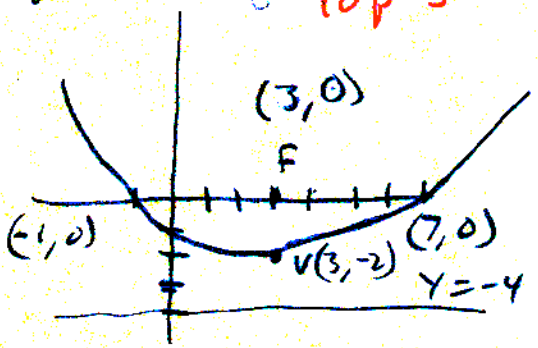
$C-\frac{b^2}{4A} \Rightarrow 0+\frac{36\cdot36}{4\cdot2}=162$ sq ft

V $f(x)=\frac{1}{8}x^2-\frac{3}{4}x-\frac{7}{8}$

$\frac{1}{8}(x^2-6x+9)-\frac{7}{8}-\frac{9}{8}$

$\frac{1}{8}(x-3)^2-2$

10 pts



$\frac{1}{8}x^2-\frac{3}{4}x-\frac{7}{8}=0$

$x^2-6x-7=0$

$(x-7)(x+1)$

intercepts = 2pts

EXTRA.

$90\cdot75\cdot16=$ total dist $=100\cdot60\cdot x$

$\frac{90\cdot75\cdot16}{100\cdot60}=x$

$x=18$ minutes

3/2/84

	5	6	T
100	3	2	5
90	10	6	16
80	8	9	17
70	1	4	5
60	3	2	5
59	0	0	0
	25	23	48

105

63

2120 1964 4171

88.4 85.3 86.9

Excellent exam - I wish I have 3 such exams. This is a little different since I have only 3 scores & 2x problems.

Part II find x-intercept is important since that is really what solve it is all about.

Key 1984

ANALYSIS CHAPTER 2

NAME _____

PER Chap 2

SHOW YOUR WORK !!!

(20 pts ea)

ANALYSIS

I Solve $\forall X \in \mathbb{C}$ Indicate any multiplicities

A) $2X^5 + 3x^4 - 4X^3 - 30X^2 - 25X = 0$ B) $2X^3 - 3X^2 - X + 12 = 0$

C) $48X^3 + 100X^2 - 58X - 20 = 0$

II A bus company charging a 20 cent fare carries 8000 riders daily. The owner determined that the company will lose 800 riders for each 5 cent fare increase. What fare yields maximum profits? (10 points)

III Determine the equation of the line given: (5 pts ea)

A) $M = \frac{3}{2}$; X-intercept is $\frac{2}{3}$ B) (1 , 30) ; (-1 , 22)

IV A rectangular flower garden is to be enclosed on the two short sides and one long side by 36 feet of wire fencing. The fourth side borders on a building. Draw a picture. Determine the maximum area which can be enclosed. (10 pts)

V Make a fairly accurate sketch of the function. On your picture locate and identify (by coordinate or equation as appropriate) the directorix, the vertex, and the focus. Determine and mark the X-intercepts. Use the method of COMPLETING THE SQUARE to put the function in "graphing form". (10 points)

GIVEN : $F(x) = \frac{1}{8}x^2 - \frac{3}{4}x - \frac{7}{8}$

EXTRA CREDIT ---------- 5 PTS ----------

When Dave walks to school, he averages 90 steps per minute, each of his steps 75 cm long. It takes him 16 minutes to get to school. His brother Jack, going to the same school by the same route, averages 100 steps per minute, but his steps are only 60 cm long. How long does it take Jack to get to school?

Analysis Ch 2 1985

I

A) $4x^4+12x^3+29x^2+60x+45=0$

	4	12	29	60	45
$-\frac{3}{2}$	4	6	20	30	0
	2	3	10	15	
$-\frac{3}{2}$	2	0	10	0	
	1	0	5		

$x \in \{-\frac{3}{2}, -\frac{3}{2}, \pm i\sqrt{5}\}$

-1	4	8	21	39	6
-1	4	16	45	105	150

B) $16x^4-64x^3-x^2+4x=0$

	16	-64	-1	4	
-11	16	-80	79	-75	
1	16	-48	-49	-45	
$\pm\frac{1}{4}$	16	-60	-16	0	
	4	-15	-4		
$-\frac{1}{4}$	4	-16	0		
	1	-4			

Try proper root but error -3

Do not try proper root -5

$x \in \{0, -\frac{1}{4}, \frac{1}{4}, 4\}$

C) $x^4-12x^3+54x^2-108x+81=0$

	1	-12	54	-108	81
-1	1	-13	67	-175	256
1	1	-11	43	-65	16
3	1	-9	27	-27	0
3	1	-6	9	0	

$x \in \{3, 3, 3, 3\}$

B) Let x = 1st Number $= \frac{1}{2}$

$1-x$ = 2nd Number $= \frac{1}{2}$

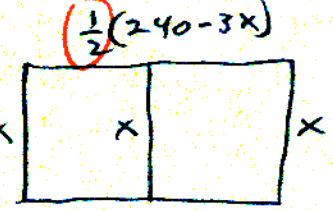
$f(x) = x^2+(1-x)^2$

$f(x) = 2x^2-2x+1$

$\frac{-b}{2A} = \frac{+2}{4} = \frac{1}{2}$

II

A) 2 pts



$A = lw$

$A(x) = x \cdot \frac{1}{2}(240-3x)$

$= 120x - \frac{3}{2}x^2$

$\frac{-b}{2A} \Rightarrow \frac{-120}{-3} = 40$

40 × 60

$\frac{1}{2}(240-120) = 60$

C) Since both problems have fctns which are parabolas and a parabola has either an max or a min at the x value of its vertex and that x value is defined to be $\frac{-b}{2A}$, the same method should yield proper answers in both situations.

III A (2, 3) ∥ $y=5$ (0, 5)
$x=-3$ (-3, 0)

$\frac{5-0}{0+3} = \frac{5}{3} = m$

$y-3 = \frac{5}{3}(x-2)$

$y-3 = \frac{5}{3}x - \frac{10}{3}$

$y = \frac{5}{3}x - \frac{1}{3}$

B) $3x+2y+2=0$

$y = -\frac{3}{2}x - 1$

$\perp \therefore m = \frac{2}{3}$

(-1, 7)

$y-7 = \frac{2}{3}(x+1)$

$y=0$ $\quad -21 = 2x+2$

$-23 = 2x$

$x = -\frac{23}{2}$

IV

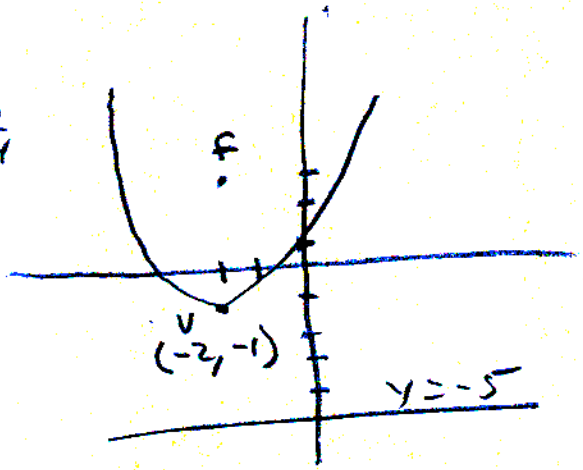
$f(x) = \frac{1}{16}x^2 + \frac{1}{4}x - \frac{3}{4}$

$\frac{1}{16}(x^2+4x+4) - \frac{3}{4} - \frac{1}{4}$

$\frac{1}{16}(x+2)^2 - 1$

$p = 4 \quad \therefore$ focus $(-2, 3)$

directrix $y=-5$



Extra

No Partial credit.

$|x|^2 + |x| - 6 = 0$

if $x>0$

$x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

reject $x=2$

if $x<0$

$x^2 - x - 6 = 0$

$(x-3)(x+2) = 0$

reject $x=-2$

$x \in \{\pm 2\}$.

3/1/185

	5	6		
100	1	2	3	103
90	9	8	17	
80	9	5	14	
70	7	7	14	
60	4	1	5	
59	2	1	3	45
	80.5	83.25	81.7	

Excellent exam — NO changes.

ANALYSIS CHAPTER 2

Ch 2 1985

NAME _____

PER ANALYSIS

I Solve $\forall x \in \mathbb{C}$ Indicate any multiplicities (15 pts ea)

A) $4x^4 + 12x^3 + 29x^2 + 60x + 45 = 0$ B) $16x^4 - 64x^3 - x^2 + 4x = 0$ C) $x^4 - 12x^3 + 54x^2 - 108x + 81 = 0$

II Application problems (total 30 pts)

A) 240 feet of fencing are to be used to enclose a rectangular plot of ground and to separate it into two parts by means of a fence parallel to one of its sides. What are the dimensions which will yield maximum area enclosed?

B) Find two numbers, whose sum is 1, such that the sum of the squares of the numbers is a minimum.

C) Explain how you know that you have the absolute maximum in part A and the absolute maximum in part B. Explain how your methods for solution of part A and part B were different and why.

III Write equations in $Y = mX + b$ form (10 pts total)

A) Find the equation of the line through (2,3) which is parallel to the line which has Y-intercept 5 and X-intercept -3.

B) Find the X-intercept of the line through (-1,7) which is perpendicular to $3X + 2Y + 2 = 0$.

IV Make a fairly accurate sketch of the function. On your picture locate and identify (by coordinate or equation as appropriate) the directorix, the vertex, and the focus. Use the method of COMPLETING THE SQUARE to put the function in "graphing form". (15 points)

GIVEN: $F(x) = \frac{1}{16}x^2 + \frac{1}{4}x - \frac{3}{4}$

EXTRA CREDIT ——— 5 PTS ———

NO PARTIAL CREDIT

Solve $\forall x \in \mathbb{C}$ $|x|^2 + |x| - 6 = 0$

ANALYSIS CHAPTER 2 NAME_____

M A K E U P E X A M PER_____

I Solve $\forall X \in \mathbb{C}$ Indicate any multiplicities (10 pts ea)

A) $3X^3 - 2X^2 + 2X + 1 = 0$

B) $12X^5 + 8X^4 + 11X^3 + 7X^2 - X = 1$

C) $6X^4 - 29X^3 + 40X^2 - 7X - 12 = 0$

D) $54X^5 - 81X^4 - 108X^3 + 163X^2 + 56X - 80 = 0$

II A commuter airline company charging 20 dollars per person per day carries 8000 riders daily. The owner determined that the company will lose 800 riders for each 5 dollar fare increase. What fare yields maximum profits? (hint: let X = # of $5 fare increases. Describe "new" fare and "new" number of riders. Their product will be your "function".) (15 points)

III Given a rectangle with perimeter Z, prove that the rectangle (to contain maximum area) must be a square. Explain your rational very clearly. (15 pts)

IV Make a fairly accurate sketch of the function. On your picture locate and identify (by coordinate or equation as appropriate) the directorix, the vertex, and the focus. Use the method of COMPLETING THE SQUARE to put the function in "graphing form". Determine AND indicate on your picture, the exact coordinates of any axis intercepts. (15 points)

GIVEN: $F(x) = \frac{1}{8}x^2 - \frac{3}{4}x - \frac{7}{8}$

V Find the equation of the circle with center at the origin which is tangent to a line which passes through coordinates (0,6) and (8,0). Remove any parenthesis and write in standard form. Draw circle and label any significant points. (15 pts)

ANALYSIS Ch 2

I 4) $3x^3-2x^2+2x+1=0$

	3	-2	2	1
$-\frac{1}{3}$	3	-3	3	0
	1	-1	1	

$x^2-x+1=0$

$x=\frac{1\pm\sqrt{1-4}}{2}$

$x=\frac{1\pm i\sqrt{3}}{2}$

$x\in\{-\frac{1}{3}, \frac{1\pm i\sqrt{3}}{2}\}$

B) $12x^5+8x^4+11x^3+7x^2-x=1$

	12	8	11	7	-1	-1
-1	12	-4	15	-8	7	-8
1	12	20	31	38	37	36
$-\frac{1}{2}$	12	2	10	2	-2	0
$\frac{1}{3}$	12	12	15	12	3	0
$-\frac{1}{2}$ 2nd time	6	1	5	1	-1	
	6	-2	6	-2	0	

Don't try # -5
DID not DON'T count -3

$x^2+1=0 \quad x=\pm i$

$x\in\{-\frac{1}{2}, -\frac{1}{2}, \frac{1}{3}, \pm i\}$

C) $6x^4-29x^3+40x^2-7x-12=0$

	6	-29	40	-7	-12
-1	6	-35	75	-82	70
1	6	-23	17	10	-2
$\frac{3}{2}$	6	-20	10	8	0
	3	-10	5	4	
$\frac{4}{3}$	3	-6	-3	0	
	1	-2	-1		
$\frac{4}{3}$	6	-21	12	9	0
	2	-7	4	3	

$x^2-2x-1=0$

$x=\frac{2\pm\sqrt{4+4}}{2}$

$\frac{2\pm 2\sqrt{2}}{2}=1\pm\sqrt{2}$

$x\in\{\frac{3}{2}, \frac{4}{3}, 1\pm\sqrt{2}\}$

D) $3x^5-6x^4+7x^3-8x^2+4x=0$

$x(3x^4-6x^3+7x^2-8x+4)=0$

	3	-6	7	-8	4
-1	3	-9	16	-24	28
1	3	-3	4	-4	0
1	3	0	4	0	

$3x^2+4=0$

$x^2=-\frac{4}{3} \quad x=\pm\frac{2i\sqrt{3}}{3}$

$x\in\{0, 1, 1, \pm\frac{2i\sqrt{3}}{3}\}$

-3pts

II

Let x = # of \$5 increases — 2 pts

$P(x) = (20 + 5x)(8000 - 800x)$ — 8 pts

$= 160000 + 40000x - 16000x - 5(800)x$

$160000 + 24000x - 4000x^2$

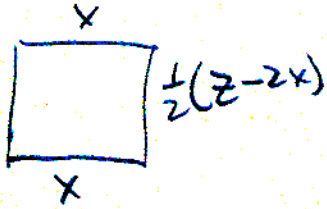
$\frac{-b}{2A} \Rightarrow \frac{-24000}{-8000} = 3$ — 3 pts

∴ 3 \$5 increases is \$15

So best price is \$35 — 2 pts

8000
2400
5600 new riders

III



$A(x) = x\left(\frac{1}{2}(2-2x)\right)$

$A(x) = \frac{1}{2}2x - x^2$

$\frac{-b}{2A} \Rightarrow \frac{-\frac{2}{2}}{-2} = \frac{2}{4} = x$

it must area if $x = \frac{2}{4}$ it 1/4 of Perimeter — a Square.

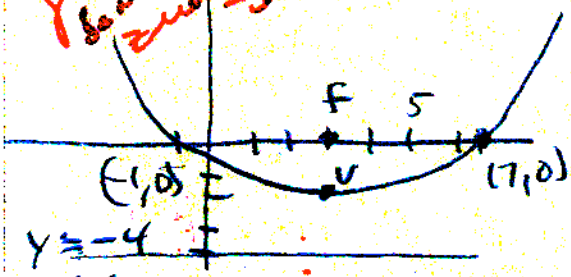
IV

$f(x) = \frac{1}{8}x^2 - \frac{3}{4}x - \frac{7}{8}$

$\frac{1}{8}(x^2 - 6x + 9) - \frac{7}{8} - \frac{9}{8}$

$= \frac{1}{8}(x-3)^2 - 2 \qquad p = 2$

graph looks like



Vertex (3, -2)

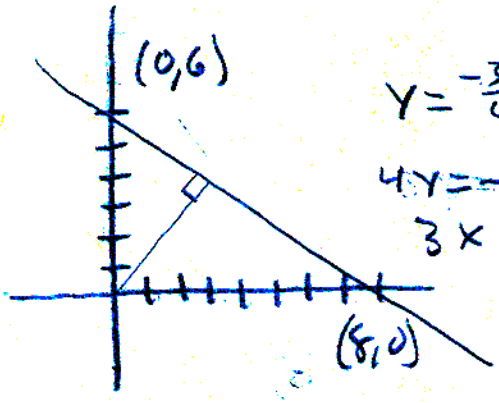
Focus (3, 0)

$x^2 - 6x - 7 \overset{\text{set}}{=} 0$

$(x+1)(x-7) = 0$

zeros of $f(x)$.

Extra



$y = \frac{-3}{4}x + 6$

$4y = -3x + 24$

$3x + 4y - 24 = 0$

$d = \frac{|-24|}{\sqrt{4^2+3^2}} = \frac{24}{5}$

$x^2 + y^2 = \left(\frac{24}{5}\right)^2$

$25x^2 + 25y^2 - 576 = 0$

24
24
416
16
536
$\frac{1}{8}x^2 - \frac{3}{4}x - \frac{7}{8}$

$x^2 - 6x - 7 = 0$

$(x-7)(x+1)$

86

Excellent exam.
Lowest scores are
Carrington's students
didn't have
alg II, others
Lost.

100	1	0	1
90	4	7	11
80	4	5	9
70	5	6	11
60	8	2	10
59	1	1	2
	76.8	81.4	79.0

ANALYSIS CHAPTER 2 ANALYSIS NAME Ch2 1985

PER Feb 28

make up 88

I Solve $\forall X \in \mathbb{C}$ Indicate any multiplicities (15 pts ea)

A) $3X^3 - 2X^2 + 2X + 1 = 0$

B) $12X^5 + 8X^4 + 11X^3 + 7X^2 - X = 1$

C) $6X^4 - 29X^3 + 40X^2 - 7X - 12 = 0$

D) $3X^5 - 6X^4 + 7X^3 - 8X^2 + 4X = 0$

II A commuter airline company charging 20 dollars per person per day carries 8000 riders daily. The owner determined that the company will lose 800 riders for each 5 dollar fare increase. What fare yields maximum profits? (hint: let X = # of $5 fare increases. Describe "new" fare and "new" number of riders. Their product will be your "function".) (15 points)

III Given a rectangle with perimeter Z, prove that the rectangle (to contain maximum area) must be a square. Explain your rational very clearly. (10 pts)

IV Make a fairly accurate sketch of the function. On your picture locate and identify (by coordinate or equation as appropriate) the directorix, the vertex, and the focus. Use the method of COMPLETING THE SQUARE to put the function in "graphing form". Determine AND indicate on your picture, the exact coordinates of any X-intercepts. (15 points)

GIVEN : $F(x) = \frac{1}{8}x^2 - \frac{3}{4}x - \frac{7}{8}$

EXTRA CREDIT---------- 5 PTS ----------

Find the equation of the circle with center at the origin which is tangent to a line which passes through coordinates (0,6) and (8,0) . Remove any parenthesis and write in standard form.

I

A) $x^5+6x^4+10x^3-4x^2-24x-16=0$

	1	6	10	-4	-24	-16
-1	1	5	5	-9	-15	-1
-1	1	7	17	13	-11	-27
-2	1	4	2	-8	-8	0
-2	1	2	-2	-4	0	
-2	1	0	-2	0		

$\frac{1,2,4,8,16}{1}$

-2 only showed

$x^2=2$

$x\in\{-2,-2,-2,\pm\sqrt{2}\}$

C) $2x^4-3x^3-x^2+12x=0$

	2	-3	-1	12	
-1	2	-5	4	8	
1	2	-1	-2	10	
$-\frac{3}{2}$	2	-6	8	0	
	1	-3	4		

$\frac{1,2,3,4,6,12}{1,2}$

$-\frac{2}{2}$ 3 $-\frac{3}{2}$

$x=\frac{3\pm\sqrt{9-16}}{2}$

$x\in\{0,-\frac{3}{2},\frac{3\pm i\sqrt{7}}{2}\}$

$\frac{3\pm i\sqrt{7}}{2}$

D) $2x^5+3x^4-4x^3-30x^2-25x=0$

	2	3	-4	-30	-25	
-1	2	1	-5	-25	0	
-1	2	-1	-4	-21		
1	2	3	-2	-27		
$\frac{5}{2}$	2	6	10	0		
	1	3	5			

$\frac{1,5,25}{1,2}$

$\frac{1}{2}$ $-\frac{1}{2}$ $\frac{5}{2}$ $-\frac{5}{2}$

$x\in\{-1,0,\frac{5}{2},\frac{-3\pm i\sqrt{11}}{2}\}$

$x=\frac{-3\pm\sqrt{9-20}}{2}$

B) $\frac{2}{3}x^2+\frac{5}{9}x=\frac{2}{3}$

$6x^2+5x-6=0$

$(3x-2)(2x+3)$

$x\in\{\frac{2}{3},-\frac{3}{2}\}$

II

Let x = # cents raised

$8+x$ = New price

$7500-100x$ = New gallons

$I(x)=(8+x)(7500-100x)$

$=8\cdot7500+(7500-800)x-100x^2$

$\frac{-b}{2A}=-\frac{(-600)}{2(-100)}=-3$

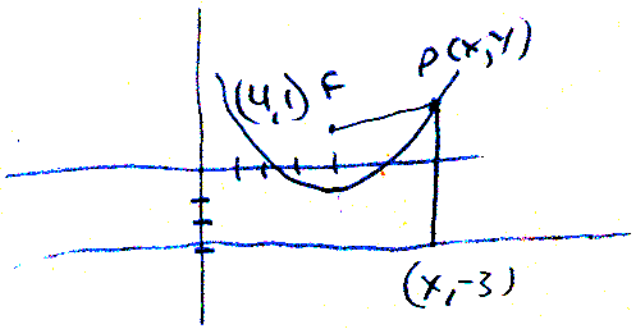
A) must Lower his price 3 cents/gal to 78¢

B) $7500+300=7800$ gal will be sold

C) $I(x)$ is a parabola which opens down ∴ it is a max. Since parabolas have only one max or min this is the Rest and only max income.

III

4) $y=-3$ $f(4,1)$



$\sqrt{(x-4)^2+(y-1)^2} = \sqrt{(x-x)^2+(y+3)^2}$

$(x-4)^2+y^2-2y+1 = y^2+6y+9$

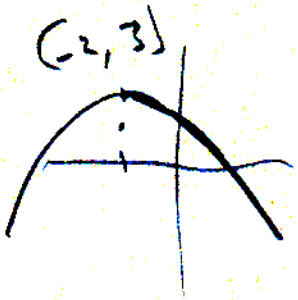
$8y = (x-4)^2 - 8$

$y = \frac{1}{8}(x-4)^2 - 1$

B) $y = -\frac{1}{2}x^2 - 2x + 1$

$= -\frac{1}{2}(x^2+4x+4)+1+2$

$= -\frac{1}{2}(x+2)^2+3$



$\frac{1}{2} = \frac{1}{4p}$, $p = -\frac{1}{2}$

Vertex $(-2,3)$

Focus $(-2, \frac{5}{2})$

directrix $y = \frac{7}{2}$

$-\frac{1}{2}x^2 - 2x + 1 \overset{\text{Set}}{=} 0$

$x^2+4x-2=0$

$x = \frac{-4 \pm \sqrt{16+8}}{2}$

$x = \frac{-4 \pm \sqrt{24}}{2}$

$x = \frac{-4 \pm 2\sqrt{6}}{2}$

$x = -2 \pm \sqrt{6}$

x-intercepts $(-2+\sqrt{6}, 0)$

$(-2-\sqrt{6}, 0)$

Extra: $f(x) = 48x^3+100x^2-58x-20$

	48	100	-58	-20
		24	50	-29	-10
-1	24	26	-55	45
1	24	74	45	35
$\frac{2}{3}$	24	66	15	0
		8	22	5

$\frac{1,2,5,10}{1,2,3,4,6,8,12,24}$

$\frac{1}{2}$ $-\frac{1}{2}$ $\frac{1}{4}$ $-\frac{1}{4}$ $-\frac{1}{6}$ $\frac{1}{8}$

2 $-\frac{5}{2}$ $\frac{2}{3}$ $-\frac{2}{3}$ $\frac{5}{12}$ $-\frac{5}{12}$

$-\frac{5}{8}$

$2(4x+1)(2x+5)(3x-2) = f(x)$

$-\frac{5}{2}$ $-\frac{1}{4}$ $\frac{2}{3}$

$f(x) > 0$

$-\frac{5}{2} < x < -\frac{1}{4}$ OR $x > \frac{2}{3}$

98

	2	5	T
100	0	0	0
90	3	6	8
80	4	7	13
70	5	6	11
60	8	1	9
59	1	0	1
	74.6	83.4	78.6

Excellent exam!
It's "welcome to the world of mathematics" for most of them.

use ~~Eqtn~~ equation with -1 as a double root the # 3 other Rational Fractions. To replace the Quad in I B

~~good exam~~

probably I should suggest in II "To find income we would multiply the New price times the New goal down $ sold"

No. change "computed" to "computes"

other change in wording of VI 4.

ANALYSIS CHAPTER 2 NAME ANALYSIS Chapt 2

PER 3/4/88

I Solve $\forall X \in C$ Indicate any multiplicities (15 pts ea)

A) $X^5 + 6X^4 + 10X^3 - 4X^2 - 24X - 16 = 0$

B) $\frac{2}{3}X^2 + \frac{5}{9}X = \frac{2}{3}$

C) $2X^4 - 3X^3 - X^2 + 12X = 0$

D) $2X^5 + 3X^4 - 4X^3 - 30X^2 - 25X = 0$

II A certain gas station sold 7500 gallons of gas daily for 81 cents per gallon. The owner knew that he would lose 100 gallons per day for each one cent raise in price. He computed his income by multiplying his price per gallon times the number of gallons sold. (total 20 pts)

A) What should have been the price of gas so that he would have had the highest income?

B) How many gallons should he sell daily?

C) How do you know that your answer in part A above is the BEST maximum? Be very specific.

III PARABOLAS Dir (10 pts ea)

Random PT X, Y the definition of parabola and the

A) Given: directorix $Y = -3$ and focus $(4,1)$. Using the "distance formula method", determine the equation of the parabola. Draw a picture showing the distances computed.

B) Using the method of "completing the square", determine the focus, vertex, equation of the directorix AND ~~the X-intercepts of:~~ all axis intercepts.

$$Y = -\frac{1}{2}X^2 - 2X + 1$$

II

EXTRA CREDIT

Determine the INTERVALS when F(x) is positive when $F(X) = 48X^3 + 100X^2 - 58X - 20$

II

A) $48x^3+100x^2-58x-20=0$

	24	50	−29	−10	
−1	24	26	−55	45	
.5	24	74	45	35	
2/3	24	66	15	0	
	8	22	5		
−1/4	24	44	−40	0	
	6	11	−10		
−5/2	24	−10	−4	0	
	12	−5	−2		

1, 2, 5, 10

1, 2, 3, 4, 6, 12, 24

1/2 −1/2 1/3 −1/3 1/4 −1/4 1/6 −1/6 1/12 −1/12 2/1 −2/1 2/3 −2/3 5/1 −5/1 5/3 −5/3 5/4 −5/4 5/6 −5/6 5/12 −5/12 10/1 −10/1 10/3 −10/3

$x = \{\frac{2}{3}, -\frac{1}{4}, -\frac{5}{2}\}$

B) $6x^4+13x^3-7x^2-26x-10=0$

	6	13	−7	−26	−10
−1	6	7	−14	−12	2
1	6	19	12	−14	−24
−1/2	6	10	−12	−20	0
	3	5	−6	−10	
−5/3	6	3	−12	−6	0
	2	1	−4	−2	

1, 2, 5, 10

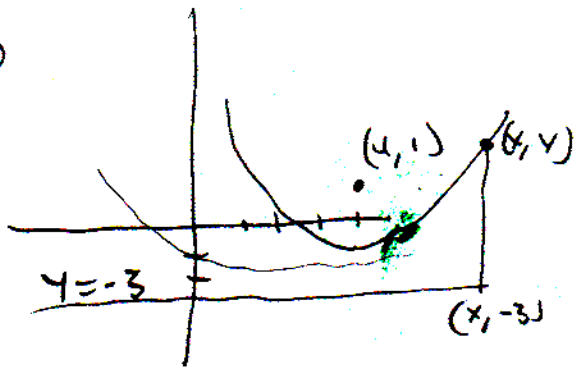
1, 2, 3, 6

−1/2 −1/3 −2/1 2/3 −5/3 5/1 5/6

$x = \{-\frac{1}{2}, -\frac{5}{3}, \pm\sqrt{2}\}$

II

A)



$\sqrt{(x-4)^2+(y-1)^2} = \sqrt{(y+3)^2}$

$(x-4)^2+y^2-2y+1 = y^2+6y+9$

$8y = (x-4)^2-8$

$y = \frac{1}{8}(x-4)^2-1$

B) $y = \frac{1}{8}x^2-\frac{3}{4}x-\frac{7}{8}$

$y = \frac{1}{8}(x^2-6x+\ \ )-\frac{7}{8}$

$y = \frac{1}{8}(x^2-6x+9)-\frac{7}{8}-\frac{9}{8}$

$y = \frac{1}{8}(x-3)^2-2$

vertex $(3, -2)$ $\quad \frac{1}{4p} = \frac{1}{8} \therefore p = 2$

focus $(3, 0)$

directrix $y = -4$

y intercept, $x=0 \Rightarrow 0, -\frac{7}{8}$

x intercept x^2-6x-7 $\quad (7, 0)$

$(x-7)(x+1)$ $\quad (-1, 0)$

III (4,3) (14,-12)

$\frac{3+12}{4-14} \quad \frac{15}{-10} = -\frac{3}{2} = m$

$y - 3 = -\frac{3}{2}(x-4)$

$y - 3 = -\frac{3}{2}x + 6$

$y = -\frac{3}{2}x + 9$

$\perp \therefore m = \frac{2}{3}$

x intercept $y = 0$

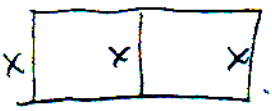
$\frac{3}{2}x = 9 \cdot \frac{2}{3}$

$x = 6$

$y = \frac{2}{3}(x-6)$

$y = \frac{2}{3}x - 4$

IV

A) 

$A = lw$

$\frac{1}{2}(240-3x) \quad A(x) = \frac{x}{2}(240-3x)$

$= 120x - \frac{3}{2}x^2$

$\frac{-b}{2a} \Rightarrow \frac{-120}{-3} = 40$

$\frac{1}{2}(240-120) = 60$ Dimensions 40×60

B) let $x = 1^{st}$ Number

$1-x = 2^{nd}$ Number

$f(x) = x^2 + (1-x)^2$

$= x^2 + 1 - 2x + x^2$

$= 2x^2 - 2x + 1$

$\frac{-b}{2a} \Rightarrow \frac{2}{4} = \frac{1}{2}$

both Numbers are $\frac{1}{2}$

C) I know I have the absolute max in A and absolute min in B because the both are Quadratics ie they are Parabolas. Parabolas have only one max many one min. The methods were not different in either part.

Extra.

let N = # of weeks to wait

$10000 - 100N$ = weight of beef

$\frac{16}{10} + \frac{N}{10}$ = Price per pound.

$600N$ = Locker charge

$U = (10000 - 100N)(\frac{16}{10} + \frac{N}{10}) - 600N$

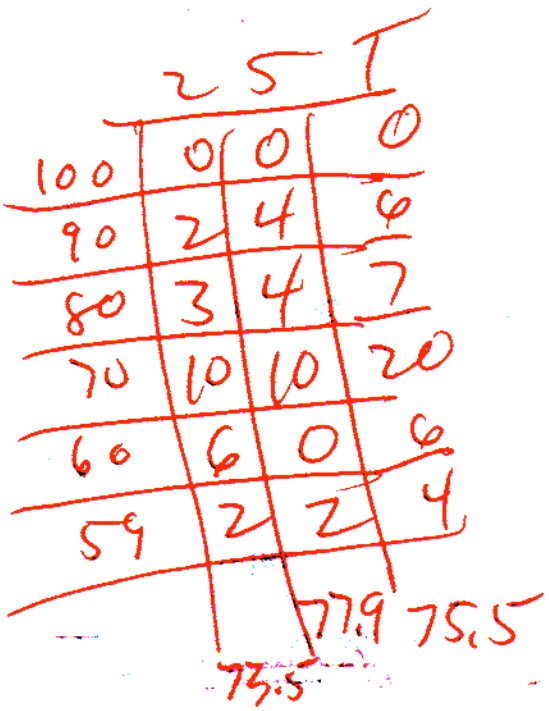
$= 10(100-N)\frac{1}{10}(16+N) - 600N$

$10[1600 + 84N - N^2] - 600N$

$16000 + 840N - 10N^2 - 600N$

$U = 16000 + 240N - 10N^2$

$-\frac{240}{-20} = 12$ he should wait 12 weeks.



Students Very poor

~~Setting~~ up max/min pblms.

Absolutely Need a sheet of these Problems to be done!

Change IV B so $C - \frac{b^2}{4a} \neq \frac{1}{2}$

many got wrong answer of $\frac{1}{2}$ and thought it was because of being a min.

Make deletions in II as shown.

Finish instructions for IV C.

HONORS ANALYSIS
Convince ME that YOU know the concept !
Copy original problem. SHOW ALL WORK !

NAME ANALYSIS Ch2

PER _____ DATE 1950

CHAPTER 2 EXAM

I Solve for $x \in$ { Complex numbers } (15 pts ea)

A) $48x^3 + 100x^2 - 58x - 20 = 0$

B) $6x^4 + 13x^3 - 7x^2 - 26x - 10 = 0$

II Parabolas (15 pts ea)

A) Draw an axis. Locate and label the point (4 , 1) as the focus. Graph the line $y = -3$ for the directorix. Sketch in a possible parabola for this information. Locate and label the random point (x , y) on your " possible parabola ". Use the " definition of a parabola " (i.e. set the proper distances equal to each other) to develop the equation, in graphing form, of the exact parabola.

B) Use the method of " completing the square " to determine the coordinates of the focus and vertex and the equation of the directorix. Determine the coordinates of ALL axis intercepts. Given:

$$y = \frac{1}{8}x^2 - \frac{3}{4}x - \frac{7}{8}$$

III Given a line passing through (4 , 3) and (14 , -12). Find the equation of a perpendicular line which has the same X-intercept. (10 pts)

IV Application problems (30 pts total)

A) 240 feet of fencing are to be used to enclose a rectangular plot of ground and to separate it into two parts by means of a fence parallel to one of its sides. What are the dimensions which will yield maximum area ?

B) Find two numbers, whose sum is 1, such that the sum of the squares of the numbers is a minimum.

C) Explain how you know that you have the absolute maximum in part A and the absolute minimum in part B. Explain how your methods for solution to part A were different and why.

EXTRA CREDIT ▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪ 5 pts ▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪

10,000 pounds of beef are in cold storage. The beef is worth $ 1.60 a pound. If the price increases steadily at 10 cents per pound per week while the beef loses 100 pounds per week (due to shrinkage) and the storage charges are $ 600 per week, how long should the beef be held in order to get the maximum income?

I $x^5+6x^4+10x^3-4x^2-24x-16=0$

4)

	1	6	10	-4	-24	-16
-1	1	5	5	-9	-15	1
-1	1	7	17	13	-11	-27
-2	1	4	2	-8	-8	0
-2	1	2	-2	-4	0	
-2	1	0	-2	0		

$\pm\{\frac{1,2,4,8,16}{1}\}$

-2

7

Not enough roots -3 (minus the zero usually)

$x^2=2$

$x=\pm\sqrt{2}$

$x\in\{-2,-2,-2,\pm\sqrt{2}\}$

B) $2x^5+3x^4-4x^3-30x^2-25x=0$

	2	3	-4	-30	-25
-1	2	1	-5	-25	0
-1	2	-1	-4	-21	
1	2	3	-2	-27	
$\frac{5}{2}$	2	6	10	0	
	1	3	5		

$\frac{1,5,25}{1,2}$

$\frac{5}{2}$

$x^2+3x+5=0$

$x=\frac{-3\pm\sqrt{9-20}}{2}$

$x\in\{0,-1,\frac{5}{2},\frac{-3\pm i\sqrt{11}}{2}\}$

C) $2x^4-3x^3-x^2+12x=0$

	2	-3	-1	12
-1	2	-5	4	8
1	2	-1	-2	10
$-\frac{3}{2}$	2	-6	8	0
	1	-3	4	

$\frac{1,2,3,4,6,12}{1,2}$

$-\frac{3}{2}$

$x^2-3x+4=0$

$x=\frac{3\pm\sqrt{9-16}}{2}$

$x\in\{0,-\frac{3}{2},\frac{3\pm i\sqrt{7}}{2}\}$

II

a) Let x = # price change

$81+x$ = # sold

b) $7500 - 100x$

c) $f(x) = (7500-100x)(81+x)$

$f(x) = (7500)(81) + 600x - 100x^2$

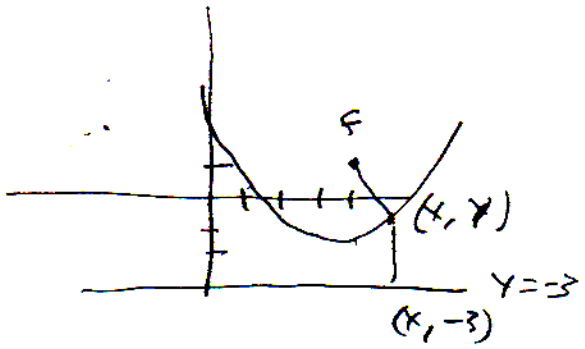
d) $\frac{-b}{2a} \to \frac{600}{-200} = -3$

$81 - 3 = 78$ ¢

e) We have a parabola with the x^2 coefficient < 0, ∴ we have the one and only max so it is the best max!

III

A)



$\sqrt{(x-4)^2+(y-1)^2} = \sqrt{(y+3)^2}$

$(x-4)^2 + y^2 - 2y + 1 = y^2 + 6y + 9$

$8y = (x-4)^2 - 8$

$y = \frac{1}{8}(x-4)^2 - 1$

No dist formula -8

B)

$y = \frac{1}{2}x^2 - 2x + 1$

$y = \frac{1}{2}(x^2 - 4x + 4) + 1 - 2$

Complete Sq -5

$y = \frac{1}{2}(x-2)^2 - 1$

Vertex $(2, -1)$

$\frac{1}{4c} = \frac{1}{2}$ focus $(2, -\frac{1}{2})$

$c = \frac{1}{2}$ Dir $y = -\frac{3}{2}$

$y = \frac{1}{2}(x-2)^2 - 1 = 0$

$(x-2)^2 = 2$

$x - 2 = \pm\sqrt{2}$

$x = 2 \pm \sqrt{2}$

x intercepts $(2+\sqrt{2}, 0)$ $(2-\sqrt{2}, 0)$

$y = \frac{1}{2}(0-2)^2 - 1$

$= \frac{1}{2}(4) - 1$

$= 2 - 1$

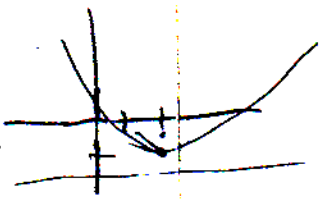
$= 1$

y intercept $(0, 1)$

EXTRA.

$f(x) = 48x^3 + 100x^2 - 58x - 20$

$f(x) = 24x^3 + 50x^2 - 29x - 10$



$\pm\{1, 2, 5, 10 / 1, 2, 3, 4, 6, 8, 12, 24\}$

	24	50	-29	-10
-1	24	26	-55	45
1	24	74	45	35
$\frac{2}{3}$	24	66	15	0
	8	22	5	

$8x^2 + 22x + 5$

$(3x-2)(4x+1)(2x+5) = f(x)$

	$-\frac{5}{2}$		$-\frac{1}{4}$		$\frac{2}{3}$	
$3x-2$	−	−	−	−	0	+
$4x+1$	−	−	0	+	+	+
$2x+5$	0	+	+	+	+	+
$f(x)$	−	0	+	0	−	0 +

$f(x) > 0$ $-\frac{5}{2} < x < -\frac{1}{4}$ or $x > \frac{2}{3}$

91

	2	5	7
100	2	0	2
90	10	8	18
80	4	8	12
70	6	5	11
60	0	1	1
59	0	2	2

101

$\frac{1917}{22}$ $\frac{1969}{24}$ $\frac{3886}{46}$ 57

87.14 82.04 84.48

Super Extra -
Timing was perfect
the notebook extra.
(there were one or two
changes in the stand-
in notebook)

Honors Analysis

Name Analysis ch 2

Copy the original problem.
Convince *me* that **you** understand the concept.

Per _____ Date 1991

CHAPTER #2

I Solve $\forall x \in C$ (i.e.. Solve for all x including complex numbers.) Indicated any multiplicities. (20 pts ea)

a) $x^5 + 6x^4 + 10x^3 - 4x^2 - 24x - 16 = 0$

b) $2x^5 + 3x^4 - 4x^3 - 30x^2 - 25x = 0$

c) $2x^4 - 3x^3 - x^2 + 12x = 0$

II A certain gas station sold 7500 gallons of gas daily for 81 cents per gallon. The owner knew that he would lose 100 gallons per day for each one cent raise in price. He computes his income by multiplying his price per gallon times the number of gallons sold. (15 pts total)

a) Let the price change be x. Write the binomial which would represent the new price per gallon including the existing 81 cents per gallon.
b) In terms of x, write the binomial which would represent the total number of gallons he would sell at this new price.
c) Based on the story, write a function F (x), which would represent the income.
d) What should be the price per gallon which would yield maximum income?
e) How do you know that your answer to part (d) is the *best* maximum? Be very specific.

III Parabolas

a) Draw an axis. Locate and label the point (4, 1) as the focus. Graph the line $y = -3$ for the directrix. Sketch in a possible parabola for this information. Locate and label the random point (x , y) on your "possible parabola." Use the "definition of a parabola" (i.e.. Set the proper distances equal to each other) to develop the equation, in graphing form, of the exact parabola. (15 pts)

b) Use the method of "completing the square" to determine the coordinates of the focus and the vertex and the equation of the directrix. Determine the coordinates of all axis intercepts. Given:

$$y = \frac{1}{2}x^2 - 2x + 1$$ (10 pts)

Extra Credit ■■■■■■■■■■■■■■■■■■■■■■■■ 5 pts ■■■■■■■■■■■■■■■■■■■■■■■■

Determine the intervals when $F(x)$ is positive given: $F(x) = 48x^3 + 100x^2 - 58x - 20$

I

A) $16x^4-8x^3-41x^2+20x+12=0$

$\frac{1,2,3,4,6,12}{1,2,4,8,16}$

	16	-8	-41	20	12	
-1	16	-24	-17	37	-15	$-\frac{1}{2}$ $\frac{1}{2}$ $-\frac{1}{4}$ $-\frac{1}{16}$ $\frac{2}{1}$ $-\frac{2}{1}$
1	16	-2	-43	-23	-11	$\frac{3}{2}$ $-\frac{3}{2}$ $-\frac{3}{4}$ $-\frac{3}{8}$ $\frac{4}{1}$ $-\frac{4}{1}$
2	16	14	-13	-6	0	$-\frac{6}{1}$
$-\frac{3}{8}$	16	-24	-32	32	0	
		2	-3	-4	4	

didn't try it -5

$x=\left\{2, -\frac{3}{8}, \frac{-1\pm\sqrt{17}}{4}\right\}$

B) $4x^5+12x^4+29x^3+60x^2+45x=0$

$x=0$

$\frac{1,3,5,9,15,45}{1,2,4}$

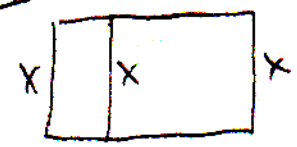
	4	12	29	60	45	$\frac{1}{2}$ $-\frac{1}{2}$ $-\frac{1}{4}$ $-\frac{3}{4}$
-1	4	8	21	39	6	$-\frac{3}{2}$ $\frac{3}{2}$ $\frac{5}{1}$ $-\frac{5}{2}$ $\frac{15}{4}$
2	4	16	45	105	15	
$-\frac{3}{2}$	4	6	20	30	0	
	2	3	10	15		
$-\frac{3}{2}$	2	0	10	0		
	1	0	5			

$x^2+5=0$

$x=\pm i\sqrt{5}$

$x=\left\{0, -\frac{3}{2}, -3, \pm i\sqrt{5}\right\}$

II



$\frac{1}{2}(240-3x)$

A) $A(x)=\frac{x}{2}(240-3x)$

$=120x-\frac{3}{2}x^2$

$-\frac{b}{2a}=\frac{-120}{-3}=40$

The Dimensions are 40×120

B) Let $x=1^{st}\#$

$1-x=2^{nd}\#$

$f(x)=(1-x)+2x^2$

$=2x^2-x+1$

$-\frac{b}{2A}=\frac{1}{4}$

one # is $\frac{1}{4}$ and the other is $\frac{3}{4}$

C) max in A because coefficient of $x^2>0$ min in B because coefficient of $x^2<0$

D) methods were not different both used the x value of the vertex which was $-\frac{b}{2a}$.

III (2, 3) (0, 5), (−3, 0)

A) $y = \frac{5}{3}x + 5$

$y - 3 = \frac{5}{3}(x - 2)$

$y = \frac{5}{3}x - \frac{10}{3} + \frac{9}{3}$

$y = \frac{5}{3}x - \frac{1}{3}$

B) (−1, 7) $3x + 24 + 2 = 0$

$y = -\frac{3}{2}x - 1$

$m = \frac{2}{3}$ ⊥

$y - 7 = \frac{2}{3}(x + 1)$

$y = \frac{2}{3}x + \frac{2}{3} + \frac{21}{3}$

$y = \frac{2}{3}x + \frac{23}{3}$ set $= 0$ 4 pts

$x = -\frac{23}{2}$ 3 pts

IV $f(x) = \frac{1}{16}x^2 + \frac{1}{4}x - \frac{3}{4}$

$\frac{1}{16}x^2 + \frac{1}{4}x - \frac{3}{4} = 0$

$x^2 + 4x - 12 = 0$

$(x - 2)(x + 6) = 0$

$x = 2, x = -6$

x intercepts

$\frac{1}{16}(x^2 + 4x + 4) - \frac{3}{4} - \frac{1}{4}$

$\frac{1}{16}(x + 2)^2 - 1$

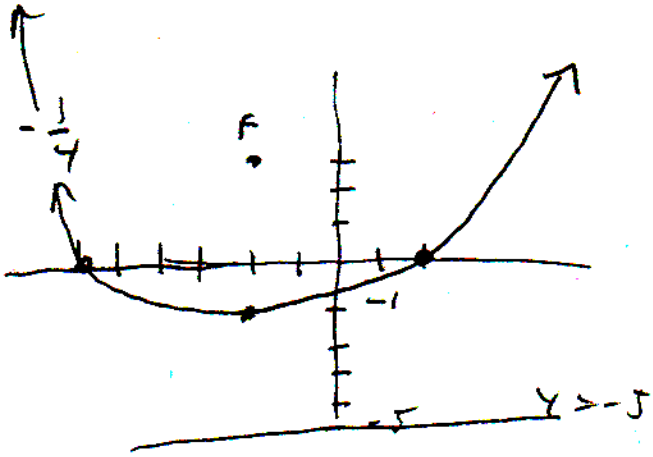
$c = 4$

Vertex $(-2, -1)$

Focus $(-2, 3)$

Directrix $y = -5$

−3 pts



Extra credit

$f(x) = Ax^2 + Bx + C$

$f(1 - x) = A(1 - x)^2 + B(1 - x) + C$ set $= Ax^2 + Bx + C$

$A - 2Ax + Ax^2 + B - Bx = Ax^2 + Bx$

$A - 2Ax + B - 2Bx = 0$

$A(1 - 2x) + B(1 - 2x) = 0$

$(1 - 2x)(A + B) = 0$

Since we want restrictions on A, B, C, it Not on x

we ignore $1 - 2x$ factor. $\therefore A = -B$.

Thus $A \neq 0$ or we don't have quadratic.

$B = -A$

$C \in \mathbb{R}$.

87

	2	5	T
100	1	1	2
90	1	3	4
80	4	7	11
70	5	6	11
60	5	4	9
54	9	3	12

66.7 75.6 71.0

101

42

only change shown on opposite side.

Super exam — very poor quality students.

Sect II was "almost unbeatin" the Lecture also related

Day before exam d'm giving back pts based on corrections & d'm giving an ass chewing!

92

I DO Needa sheet of
alg mod/mix problems
in this unit! Also it seems
I Needa add a bit on straight lines.

Questions — about
1, 2 put the 1st to
4 days to do this?

100			
90		3	3
80	3	4	7
70	4	6	10
60	2	2	4
59	4	7	11

99

39

68.3

665 69.32

$\frac{2390}{35}$

13

$\frac{1525}{22}$

I hand out list of Problems
to complete in addition
to extra corrections for
return of ½ of lost pts.
Maybe they'll figure it out
this time.

Honors Analysis
Copy original problem.
Convince *me* that **you** understand the concept!

Name Ch2 ANL

Per _____ Date 1992

Chapter 2 Exam

I Solve for values of x including complex numbers, if any. (Solve $\forall\ x\ \varepsilon\ \mathbf{C}$.) (20 pts ea)

a) $16x^4 - 18x^3 - 41x^2 + 20x + 12 = 0$

b) $4x^5 + 12x^4 + 29x^3 + 60x^2 + 45x = 0$

Copy Eg 2 p. 72-73 in its entirety

II Application problems p. 74-75 #25, 26, 27 & p. 164 1, 2 (25 pts total)

a) Two hundred forty feet of fencing are to be used to enclose a rectangular plot of ground and to separate it into two parts by means of a fence parallel to one of its sides. What are the dimensions which will yield maximum area enclosed?

b) Find two numbers, whose sum is one, such that the sum of one of the numbers and twice the square of the other is a minimum.

c) Explain how you know that you have the absolute maximum in part A and the absolute minimum in part B.

d) Explain how your methods for solution of part A and solution of part B were different and why.

III Straight lines p. 16 1-6, p. 17 17-26, p. 24 11-20, p. 59 Quadrat. 1-6, p. 60 1-12, 19-22, p. 68 9-18 (10 pts ea)

a) Find the equation of the line through (2, 3) which is parallel to the line which has *y*-intercept 5 and has *x*-incercept 3.

b) Find the *x*-intercept of the line through (– 1, 7) which is perpendicular to : $3x + 2y + 2 = 0$

IV Use the method of ***completing the square*** to put the function in "graphing form." Make a fairly accurate sketch of the function listed below. (That would include coordinates of all axis intercepts, of course). On your picture, locate and identify (by coordinate or equation as appropriate) the directrix, vertex, and the focus. (15 pts)

p. 78-79 3, 5, 12, 13, 15-17, 21, 23

$$F(x) = \tfrac{1}{16}x^2 + \tfrac{1}{4}x - \tfrac{3}{4}$$

Extra Credit ═══ 5 pts ═══

Given: $F(x) = ax^2 + bx + c$ and $D_F\ \ x \neq \frac{1}{2}$

Determine the restrictions on a, b, and c so that $F(1-x) = F(x)$.

I

A) $2x^5-11x^4+14x^3-2x^2+12x+9=0$

	2	−11	14	−2	12	9
4	2	−13	27	−29	41	−32
1	2	−9	5	3	15	24
3	2	−5	−1	−5	−3	0
3	2	+1	2	1	0	
$-\frac{1}{2}$	2	0	2	0		
	1		1			

$x^2+1=0$

$x \in \{3, 3, -\frac{1}{2}, \pm i\}$

$\frac{p}{q} = \pm\{\frac{1,3,9}{1,2}\}$

$-\frac{1}{2}, \pm 3, -\frac{3}{2}, -9$

$-\frac{1}{2}, \pm 3$

No solutions & didn't appear to try above $-\frac{1}{2}$ / tried & didn't appear / did try above / made error -1

1, 2, 3, 4, 6, 12

1, 2, 4, 8, 16

$\pm\frac{1}{2}, \pm\frac{1}{4}, -\frac{1}{16}, \pm 2$

$\pm\frac{3}{2}, -\frac{3}{4}, -\frac{3}{8}$

$\frac{1}{2}, 2, \frac{3}{2}, -\frac{3}{8}$

B) $16x^4-18x^3-41x^2+20x+12$

	16	−18	−41	20	12
−1	16	−34	−7	27	−15
1	16	−2	−43	−23	−11
2	16	14	−43	−6	0
$-\frac{3}{8}$	16	8	−16	0	
	2	1	−2		

$2x^2+x-2=0$

$\frac{-1\pm\sqrt{1+16}}{2}$

$x \in \{2, -\frac{3}{8}, \frac{-1\pm\sqrt{17}}{2}\}$

C) ~~$4x^2(2x-9)=27(1-2x)$~~

~~$8x^3-36x^2=27-54x$~~

$8x^3-36x^2+54x-27=0$

	8	−36	54	−27
−1	8	−44	98	−125
1	8	−28	26	−1
$\frac{3}{2}$	8	−24	18	0
	4	−12	9	

$(2x-3)^2$

$x \in \{+\frac{3}{2}, +\frac{3}{2}, \frac{3}{2}\}$

NO Neg Roots

5.23

1, 3, 9, 27

1, 2, 4, 8

$\frac{3}{2}$ only close

D) $12x^4+4x^3-29x^2+20x-4=0$

	12	4	−29	20	−4	$\frac{1,2,4}{1,3,4,6,12}$
−1	12	−8	−21	41	−45	
1	12	16	−13	7	+3	$\pm\frac{1}{2}, \pm\frac{1}{4}$ ~~$\pm\frac{1}{3}$~~
$\frac{1}{2}$	12	10	−24	8	0	$\frac{2}{3}$
	6	5	−12	4		
$\frac{1}{2}$	6	8	−8	0		
	3	4	−4			

$(3x+2)(x+2)$

$x \in \{\frac{1}{2}, \frac{1}{2}, \frac{2}{3}, -2\}$

II Let x = Increase

$(10+x)$ New Price

$(300-15x)$ New Pass → 15

$P(x) = (10+x)(300-15x)$

$= 3000+150x-15x^2$

$\frac{-150}{-30} = 5$

this is a parabola and it has only one max! (is the vertex)

III

A) $m = \frac{3}{2}$ $\left(\frac{2}{3}, 0\right)$

$y - 0 = \frac{3}{2}\left(x - \frac{2}{3}\right)$

$y = \frac{3}{2}x - 1$

B) $(1, 30)$ $(-1, 22)$

$\frac{30-22}{1+1} = \frac{8}{2} = 4 = m$

$y - 30 = 4(x-1)$

$y = 4x - 4 + 30$

$y = 4x + 26$

IV

$f(x) = -\frac{1}{12}x^2 + \frac{1}{2}x + \frac{5}{4}$

$= -\frac{1}{12}\left(x^2 - 6x + \quad\right) + \frac{5}{4}$

$= -\frac{1}{12}\left(x^2 - 6x + 9\right) + \frac{3}{4} + \frac{5}{4}$

$= -\frac{1}{12}(x-3)^2 + 2$

$\frac{1}{4p} = -\frac{1}{12}$

$p = -3$

opens down

y intercept $\left(0, \frac{5}{4}\right)$

Vertex $(3, 2)$

focus $(3, -1)$

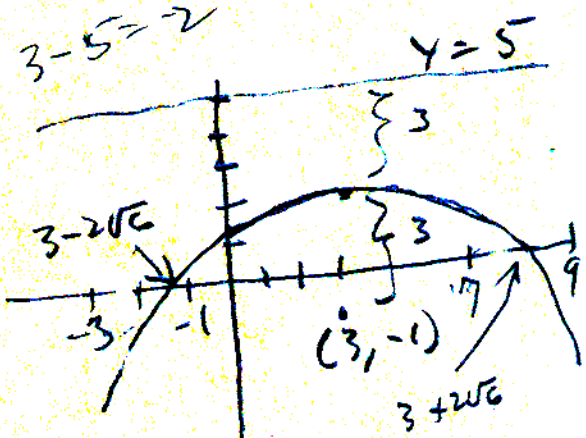
directrix $y = 5$

$-\frac{1}{12}(x-3)^2 + 2 = 0$

$(x-3)^2 = 24$

$x - 3 = \pm 2\sqrt{6}$

$x = 3 \pm 2\sqrt{6}$



$2 < \sqrt{6} < \sqrt{9} = 3$

$-3 < 3 - 2\sqrt{6} < -1$

$7 < 3 + 2\sqrt{6} < 9$

Note

$A(x)$ is parabola

coefficient of x^2 is

neg. $\therefore$ max at

vertex is $x = \frac{-b}{2a}$.

Extra.

$\sqrt{\frac{8^{10} + 4^{10}}{8^4 + 4^{11}}} = \sqrt{\frac{2^{10} \cdot 4^{10} + 4^{10}}{(2^3)^4 + 2^{22}}}$

$\sqrt{\frac{4^{10}(2^{10}+1)}{(2^2)^4 + 2^{22}}} = \sqrt{\frac{4^{10}(2^{10}+1)}{2^{12}(1+2^{10})}} = \sqrt{\frac{2^{20}}{2^{12}}}$

$(2^3)^4 + 2^{22}$

$2^{12} + 2^{22}$

$2^{12} + 2^{12} \cdot 2^{10}$

$\sqrt{2^8} = 2^4 = 16$

89

	2	5	T
100	1	1	2
90	7	9	16
80	9	1	10
70	3	3	6
66	3	1	7
59	0	0	0

84.6 88.3 86.3

104

66

make changes & hanson

I thought this would be
10 pts the higher than
it was. oh well...
still is a good exam,

	2	5	T
100	6	0	
90	2	10	
80	13	6	
70	7	3	
60	0	2	
59	0	0	

1814 / 20 — 1777 / 21 — 359 / 43

82.45 — 84.62 — 83.5

Excellent exam.

Next time I use this one I need to change the roots, say, to negatives of this one so no advantage is given

Honors Analysis

Name Analysis Ch 2

Copy original problem.

Per _____ Date 3/11/93

Convince *me* that you understand the concept!

Chapter 2 Exam

I

Solve $\forall\ x\ \varepsilon\ \mathbf{C}$ (i.e. answers may be complex). Be sure to indicate any multiplicities. (15 pts ea)

a) $2x^5 - 11x^4 + 14x^3 - 2x^2 + 12x + 9 = 0$

b) $16x^4 - 18x^3 - 41x^2 + 20x + 12 = 0$

c) $4x^2(2x - 9) = 27(1 - 2x)$

d) $12x^4 + 4x^3 - 29x^2 + 20x = 4$

II

A helicopter service company operating between an airport and the center of the city charges a fare of \$10 per person and carries 300 passengers per day. The owner extimates that he would lose 15 passengers per day for each one-dollar increase in fare. (15 pts total)

a) Let x be the **increase** in fare,

1) Describe the **new** (in terms of x) number of riders.

2) Describe the **new** fare (in terms of x) each rider would pay.

b) Determine the function which describes the gross income for the company. (# of items times value each = total value.)

c) Determine what fare the company should charge for maximum income.

d) Explain how you know that your answer is, indeed, the most desireable from the company's point of view.

III

Determine the equation of the straight line given: (5 pts ea)

a) slope $= \frac{3}{2}$ x-intercept $= \frac{2}{3}$

b) $(1, 30)\ ;\ (-1, 22)$

IV

Make a fairly accurate sketch of the function. On your picture, locate and identify (by name and by coordinate or equation as appropriate) the following items: x-intercept(s) and the y-intercept(s), the directrix, the vertex, and the focus. Use the method of completing the square to put the function into graphing form:

15 pts

Given function: $f(x) = \frac{-1}{12}x^2 + \frac{1}{2}x + \frac{5}{4}$

Extra Credit ---------- **5 pts** ----------

Simplify. Be sure your steps are clear: $\sqrt{\frac{8^{10} + 4^{10}}{8^4 + 4^{11}}}$

the Table home activity was essential!!!!

Still, many tried to copy the Quiz rather than do as they were told in I.

Perhaps add the line
"all intersections of significance are integers."
basically
they are horrible of IT student!!!!

100	0	0	0
90	3	4	8
80	2	4	6
70	3	6	8
60	3	1	4
59	1	2	2

97
50

420/12 1333/17 2253/29

77.7

7667 78.41
6th 5th

I $x^2-6x-16y-23=0$

A) $x^2-6x+9-32=16y$

$y=\frac{1}{16}(x-3)^2-2$

B) $y=\frac{1}{4c}(x-4)^2+k$

focus $(3, \cancel{-2}+4)$

$(3,2)$

$\frac{1}{4c}=\frac{1}{16}$ set

$c=4$ 1st fun vertex to focus, fun vertex to directrix

C) $m=\frac{3}{4}$ $(3,2)$

$y-2=\frac{3}{4}(x-3)$

$y=\frac{3}{4}x-\frac{1}{4}$

$y=\frac{3}{4}(19)-\frac{1}{4}$

$=\frac{57-1}{4}$

$\frac{56}{4}$

$=14$

D) $\left(\frac{1}{16}(x-3)^2-2\right) \overset{\text{set}}{=} \frac{3}{4}x-\frac{1}{4}$ | 16

$(x-3)^2-32=12x-4$

$x^2-6x+9-32-12x+4=0$

$x^2-18x-19=0$

$(x-19)(x+1)=0$

$x\in\{19,-1\}$

$(19,14)$ $(-1,-1)$

$y=\frac{3}{4}(-1)-\frac{1}{4}$

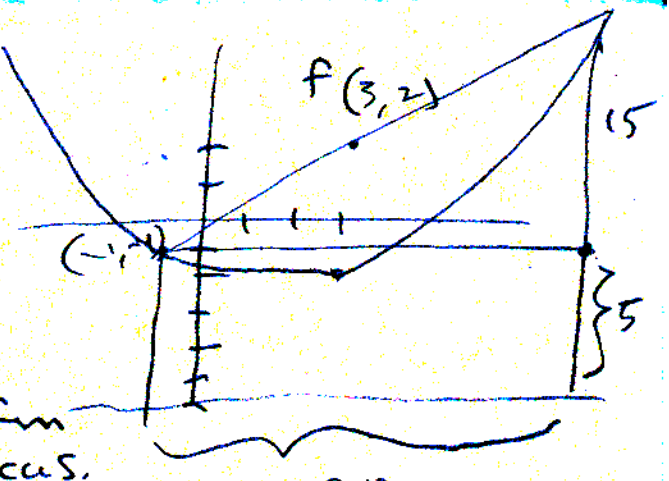
$y=-1$

up to "D" method -8

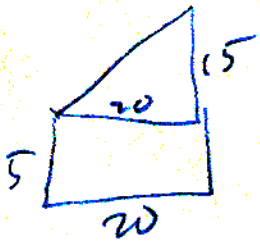
No pict -10 to -12

E)

F)



G)



$5\cdot 20+10\cdot 15$

$100+150$

$250=$ area of figure

II A $2x^3-3x^2-x+12=0$

	2	−3	−1	12
−1	2	−5	4	8
1	2	−1	−2	10
$\frac{-3}{2}$	2	−6	8	0
	1	−3	4	

$\pm\left\{\frac{1,2,3,4,6,12}{1,2}\right\}$

$\cancel{1}\ \cancel{-1}\ \frac{3}{1}\ \frac{-3}{2}$ $(2x+3)(x^2-3x+4)=0$

$x=\frac{3\pm\sqrt{9-16}}{2}$

$\frac{3\pm i\sqrt{7}}{2}$

II B) $2x^5 - 5x^4 - 17x^3 - 35x^2 - 25x = 0$

$\pm\{1, 5, 25 / 1, 2\}$

	2	−5	−17	−35	−25
−1	2	−7	−10	−25	0
−1	2	−9	−1	−24	
7	2	−5	−15	−40	
$-\frac{1}{2}$	2	−8	−6	22	
5	2	3	5	0	

$x = \frac{-3 \pm \sqrt{9-40}}{4}$

$x \in \left\{5, \frac{-3 \pm i\sqrt{31}}{4}, -1, 0\right\}$

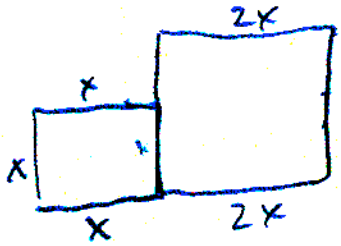
$x(x+1)(x-5)(2x^2+3x+5) = 0$

$\pm\{1, 5 / 1, 2\}$

$\pm 1, \pm 5, \pm \frac{1}{2}, \pm \frac{5}{2}$

Don't DO −1 grade Tech −10

III 4)



$5 \cdot 5$

$7x + 2y = 2400$

4 pts: $y = 1200 - \frac{7}{2}x$

$A = 2x\left(1200 - \frac{7x}{2}\right) + x^2$

$= 2400x - 7x^2 + x^2$

$= 2400x - 6x^2$

$C - \frac{b^2}{4a}$

$0 - \frac{2400 \cdot 2400}{4 \cdot 6}$

$240{,}000$

max area enclosed was 240,000 sq ft.

B) Let x = 1st #

$3 - x$ = 2nd #

$f(x) = x^2 + 3 - x$

$c - \frac{b^2}{4a} = 3 - \frac{1}{4}$

$= 2\frac{3}{4}$

min value is $\frac{11}{4}$

c) Since both functions were quadratic, they were parabolas. Parabolas have only a single max or single min. In part a I found the answer and in part b I found the only min therefore I found the absolute extreme value.

Extra.

43 = 1

1806 = 3

Both 1806 and 1805 = 5

19th cent 1800's.

He was 43 in 1849

$40^2 = 1600$

$41^2 = 1681$

$42^2 = 1764$

$43^2 = 1849$ ←

$45^2 = 2025$

So he was born in 1806 or 1805. (He may not have had his birthday in 1849 when he wrote the quote)

Still a good exam — too many students were not serious about work and it caught up with them.

I was out 2 days because of computer and didn't emphasize the steps of the alg. II extreme problems.

100	1
90	2
80	4
70	4
60	7
59	6

100 ↓ 30

$\frac{1666}{24} = 69.4$

also .... I didn't collect HW properly the last 4 assignments. DIDN'T actually grade take home Quiz — it Does need to be graded. actually I should grade each one then hand back and go over on the board.

Honors Analysis

Name AnL Ch 2

Per _____ Date 98

Copy original problem.

Convince *me* that you understand the concept!

No Calculators!

Chapter 2 Exam

I Given: the parabola $x^2 - 6x - 16y - 23 = 0$ and the line through the focus of the parabola with slope three-fourths. Do **NOT** use decimal fractions. (40 pts total)
Remember to be very clear concerning your methods. ***Answer only is unacceptable.***

a) Re-write the equation of the parabola in graphing form (using the method of completing the square).

b) Determine the coordinates of the focus.

c) Determine the equation of the given line.

d) Determine the coordinates common to both the line and the parabola.

e) Sketch the parabola, the line through the focus and the directrix of the parabola on the same axis.

f) Draw vertical lines from the points found in part " d " to the directrix.

g) Find the area of the four-sided figure formed by the two lines drawn in step " f ", the directrix and the line with slope three-fourths.

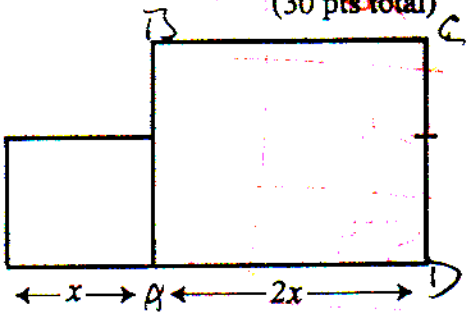
II Solve for all values x (including complex numbers). Show RRTS at work. **Write each equation in factored form** where the factors are either first degree or prime, second degree. (15 pts ea)
Do **NOT** use decimal fractions.

a) $2x^3 - 3x^2 - x + 12 = 0$

b) $2x^5 - 5x^4 - 17x^3 - 35x^2 - 25x = 0$

III Application. Be especially sure to use the proper set-up and answer the question asked using a **complete** sentence. Do **NOT** use decimal fractions. (30 pts total)

a) Two adjacent pens are to be constructed using 2,400 feet of fencing. The smaller pen is square and the other is rectangular. See the picture. What is the maximum area which can be enclosed?



b) The sum of two positive numbers is three. What is the smallest total that can be made when the square of one of the numbers is added to the other number?

c) Explain how you know that you found the absolute maximum in part a and the absolute minimum in part b.

Extra Credit ---------- 5 pts ----------

Augustus De Morgan was alive during the nineteenth century and once wrote, "I was x years old in the year x^2. What was the year of his birth?

I

A) $6x^5 - 29x^4 + 40x^3 - 7x^2 = 12x$

$\pm\left\{\frac{1,2,3,4,6,12}{1,2,3,4,6}\right\}$

$-\frac{1}{2}, -\frac{1}{3}, \frac{1}{4}, \frac{1}{6}, -\frac{1}{12}, -\frac{2}{1}, \boxed{\frac{2}{3}}, -\frac{2}{3}, \frac{3}{1}$

$\boxed{\frac{3}{2}}, -\frac{3}{4}, \frac{3}{4}, \frac{4}{1}, \boxed{\frac{4}{3}}, -\frac{4}{3}, \frac{4}{1}, -\frac{4}{1}$

$x(6x^4 - 29x^3 + 40x^2 - 7x - 12) = 0$

	6	−29	40	−7	−12
−1	6	−35	75	−82	70 (43)
1	6	−23	17	−10	−2
2/3	6	−25	24		
3/2	6	−20	10	8	0
	3	−10	5	4	
4/3	6	−21	12	9	0
	2	−7	4	3	

finally .... $x^2 - 2x - 1 = 0$

$x = \frac{2 \pm \sqrt{4+4}}{2}$

$\frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$

$x \in \left\{0, \frac{3}{2}, \frac{4}{3}, 1 \pm \sqrt{2}\right\}$

B) $24x^5 + 44x^4 + 50x^3 + 73x^2 + 4x - 30 = 0$

$\pm\left\{\frac{1,2,3,5,6,10,15,30}{1,2,3,4,6,8,12,24}\right\}$

$\frac{1}{2}, -\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, -\frac{2}{1}, -\frac{2}{3}, -\frac{3}{2}, -\frac{3}{4}, -\frac{5}{2}$

$\frac{5}{3}, -\frac{5}{4}, -\frac{5}{6}, -\frac{5}{8}, -\frac{10}{1}$

	24	44	50	73	4	−30
−1	24	20	30	43	−39	9
1	24	68	118	191	195	165 (11.3.5)
1/2	24	56	78	112	60	0 (48)
	12	28	39	56	30	
−3/2	24	8	38	16	−20	0
	12	4	19	8	−10	
−5/6	24	24	30	48	−36	0
	4	4	5	8	−6	

last root last method was good. −3

also $x^2 + 2 = 0$

$x = \pm i\sqrt{2}$

$x \in \left\{\frac{1}{2}, -\frac{3}{2}, -\frac{5}{6}, \pm i\sqrt{2}\right\}$

II

A) Let x = width

$\frac{1}{2}(2-2x)$ $\frac{1}{2}(2-2x)$ = length

$A = lw$

$A(x) = x\left(\frac{1}{2}(2-2x)\right)$

$= \frac{1}{2}2x - x^2$

$\frac{-b}{2a} = \frac{-\frac{1}{2}2}{-2}$

$x = \frac{2}{4}$

$\frac{1}{2}\left(2 - 2\left(\frac{2}{4}\right)\right) = \frac{2}{4}$ ∴ Square

$L = w$

No fctn −8

II 6) let x = 1st # $\quad 2x^2 + (1-x) = f(x)$ $\quad -\frac{4}{24}$ $\quad +\frac{1}{4}$

$1-x$ = 2nd # $\quad 2x^2 - x + 1 = f(x)$

use $c - \frac{b^3}{4a} = -2$

The numbers are $\frac{1}{4}$ and $\frac{3}{4}$

III $f(x) = \frac{1}{16}x^2 + \frac{1}{4}x - \frac{3}{4}$

$\frac{1}{16}(x^2 + 4x + 4) - \frac{3}{4} - \frac{1}{4}$

$= \frac{1}{16}(x+2)^2 - 1$

$\because c^2 = 4$

vertex $(-2, -1)$

focus $(-2, 3)$ $\quad (-\frac{3}{4}, 0)$

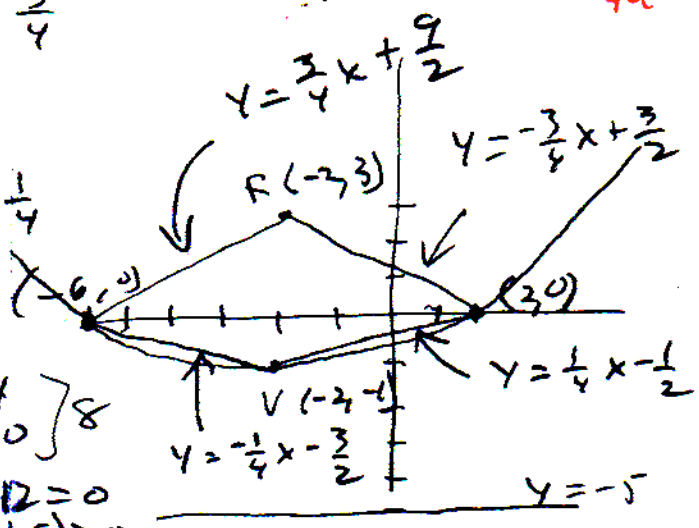
directrix $y = -5$

x intercepts $(-6, 0)$, $(2, 0)$

$\boxed{f(x) = 0}$ 8

$x^2 + 4x - 12 = 0$

$(x-2)(x+6) = 0$



$\frac{-1-0}{-2-2} = \frac{1}{4} = m$ $\quad y = \frac{1}{4}(x-2)$ $\quad y = \frac{1}{4}x - \frac{1}{2}$

$\frac{-1-0}{-2+6} = -\frac{1}{4} = m$ $\quad y = -\frac{1}{4}(x+6)$ $\quad y = -\frac{1}{4}x - \frac{3}{2}$

$\frac{3-0}{-2+6} = \frac{3}{4} = m$ $\quad y = \frac{3}{4}(x+6)$ $\quad y = \frac{3}{4}x + \frac{9}{2}$

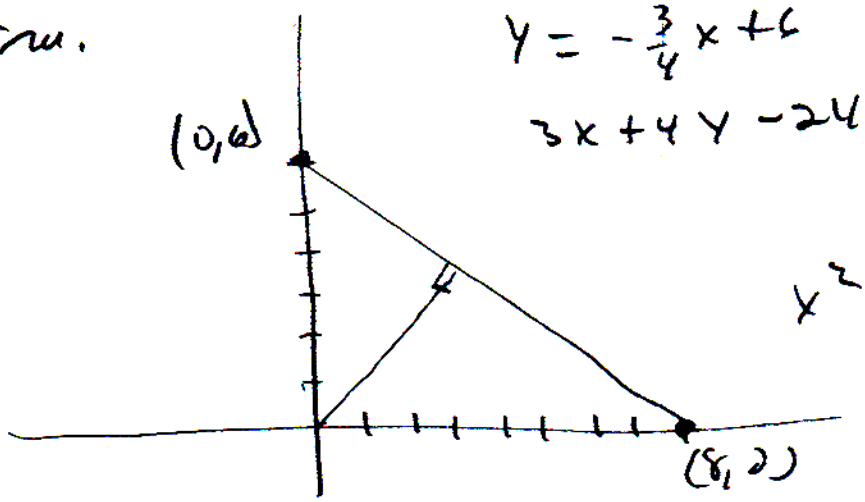
$\frac{3-0}{-2-2} = -\frac{3}{4} = m$ $\quad y = -\frac{3}{4}(x-2)$ $\quad y = -\frac{3}{4}x + \frac{3}{2}$

area:

4pts $\quad \frac{1}{2} \cdot 8 \cdot 3 + \frac{1}{2} \cdot 8 \cdot 1 =$ ___ sq units

$12 + 4 = 16$ sq units.

Extrm.



$y = -\frac{3}{4}x + 6$

$3x + 4y - 24 = 0$

$\frac{|-24|}{\sqrt{9+16}}$

$r = \frac{24}{5}$ $\quad 144$ $\quad 4$

$x^2 + y^2 = \left(\frac{24}{5}\right)^2$

$25x^2 + 25y^2 - 576 = 0$

	4	5	T
100	0	0	0
90	1	0	1
80	5	2	7
70	0	8	8
60	7	4	11
59	6	3	9
	65.4	66.9	66.0

99

20

1238 1138

19 17

we have subsidized our on board tour.

students "played" the day before in spite of several warnings. They got exactly what they earned.

Honors Analysis

Name AWL 2

Per _____ Date 99

Copy original problem.

Convince *me* that you understand the concept!

No decimals!

Chapter 2 Exam

I Solve for all x (including complex values, if any). Show ERRTS at work. (15 pts ea)

a) $6x^5 - 29x^4 + 40x^3 - 7x^2 = 12x$

b) $24x^5 + 44x^4 + 50x^3 + 73x^2 + 4x - 30 = 0$

II Extreme value problems. Proper setup is very important. Your final answer must be a complete, meaningful sentence. (10 pts ea)

a) Given a rectangle with perimeter z. Prove that the rectangle (which contains maximum area) must be a square. Explain your rationale very clearly.

b) Find two numbers which add to one such that the sum of one of the numbers and twice the square of the other is a minimum. Parabola, Lines, Triangles.

III Given the parabola: $f(x) = \frac{1}{16}x^2 + \frac{1}{4}x - \frac{3}{4}$

Use the "method of completing the square" to put the function into "graphing form". Specifically identify the vertex, focus, axis intercepts and directrix.

Sketch $f(x)$ showing all items listed above. Draw 4 lines as follows: From each x-intercept through the vertex and from each x-intercept through the focus. Identify each line with its equation (in slope-intercept form).

Determine the area of the quadrilateral formed by the 4 lines. (50 points total)

Extra Credit ---------- 5 pts ----------

Find the equation of the circle with center at the origin which is tangent to a line which passes through coordinates (0,6) and (8,0). Remove any parentheses and write in "standard" form (all coefficients are integers and the entire expression equals zero.)

3/11/99 Great season
No changes

Zac Hays 80
Todd Jansen 74
Andrea Hembree 68
Renee Shamieh 61
Laura Lampky 51

3/8/2000

Aaron Stigner 66

3/7/2002

Kevin Lee 70
Andrea Thomas 58
Andrew Kent 40
Alan Savage 38

II

9) Let x = # of trees planted

$600 - 12(x-24)$ = # apples/tree.

Tot Apples/Acre = (# trees)(# Apples/tree)

$A(x) = x(600 - 12x + 288)$

$= 888x - 12x^2$

$\frac{b}{2a}$ $\quad \frac{-888}{-2 \cdot 12} = 37$

$2 \cdot 4 \cdot 3$

They need to plant 37 trees/Acre

13) Let N = # weeks to wait.

New weight = $10{,}000 - 100N$

Value now = $\frac{16}{10}$

New value = $\frac{16}{10} + \frac{N}{10}$

Storage = $600N$

Revenue = (# of items)(value ea) + Storage

$V = 100(100-N)\frac{1}{10}(16+N) - 600N$

$= 10(1600 + 84N - N^2) - 600N$

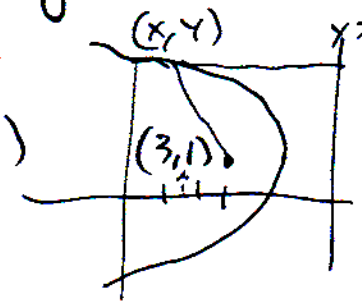
$16000 + 240N - 10N^2$

$\frac{-240}{-2 \cdot 10} = 12$

He must hold the meat 12 weeks

III

A)

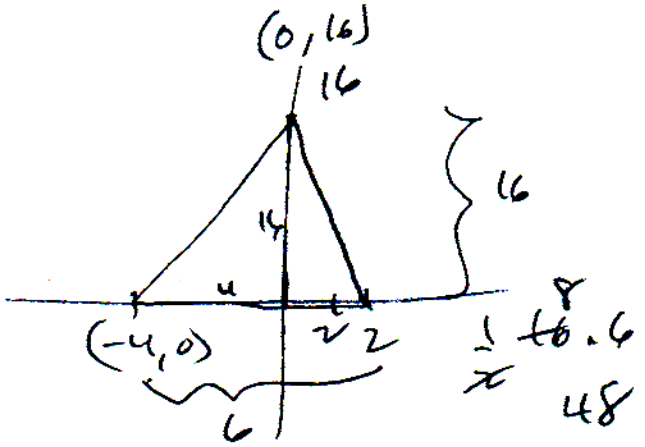


$(x-3)^2 + (y-1)^2 = (x-7)^2$

$x^2 - 6x + 9 + (y-1)^2 = x^2 - 14x + 49$

$8x = -(y-1)^2 + 40$

$x = -\frac{1}{8}(y-1)^2 + 5$



$\frac{1}{2} \cdot 16 \cdot 6 = 48$

B) $2x^2 + 4x + y - 16 = 0$

$y = -2x^2 - 4x + 16$

$-2(x^2 + 2x + 1) + 16 + 2$

$y = -2(x+1)^2 + 18$

Vertex $(-1, 18)$

$\frac{1}{4c} = -2$

$c = -\frac{1}{8}$

focus $(-1, 17\frac{7}{8})$

directrix $y = 18\frac{1}{8}$ $\quad \frac{145}{8}$

$2x^2 + 4x + 0 - 16 = 0$

$x^2 + 2x - 8 = 0$

$(x-2)(x+4)$

Area 48

$d_1 = \sqrt{-4^2 + 16^2}$

$= 16 + 16^2$

$16(1+16)$

$4\sqrt{17}$

$16^2 + 4$

$256 + 4$

$260 = 13 \cdot 2 \cdot 10$

$2^2 \cdot 65$

$2\sqrt{65}$

Perim $6 + 4\sqrt{17} + 2\sqrt{65}$

Honors Analysis

Name Ch 2 Anl

Per _____ Date Mu

Copy original problem.

Convince *me* that **you** understand the concept!

Do not use decimal approximations

Chapter 2 make–up Exam

I Determine the domain for each of the following (15 pts ea)

a) $A(x)=\sqrt{\dfrac{36x^3+51x^2-14x-24}{24x^3-76x^2+66x-9}}$

b) $B(x)=\dfrac{-\sqrt{29}}{8x^5+60x^4+154x^3+153x^2+27x-27}$

II Word problem. Remember to provide a proper setup. (30 pts)

The owner of an apple orchard estimates that if 24 trees are planted per acre, then each mature tree will yield 600 apples per year. For each additional tree planted per acre, the number of apples produced by each tree decreases by 12 apples per year due to competition for water, nutrients, sunlight, etc. (Thus, for example, if 25 trees were planted per acre, then *each* tree would produce : $600 - 12(25 - 24) = 588$ apples per year.) Determine the number of trees per acre which will produce the most apples per acre.

III Parabolas (20 pts ea)

a) Given the focus (3, 1) and the directrix $x = 7$. Select a point on the parabola and label it (x, y). Use the definition of a parabola (distance from the focus to a point is equal to the distance from the point to the directrix) to write the equation of the parabola, in graphing form.

b) Given $2x^2+4x+y-16=0$.

1. Determine the coordinates of the focus and the equation of the directrix.
2. A triangle is formed when the three axis intercepts are connected. Determine the perimeter and area of the triangle.

I

$$A(x)=\sqrt{\frac{36x^3+51x^2-14x-24}{24x^3-76x^2+66x-9}}$$

$$\sqrt{\frac{(4x+3)(3x+4)(3x-2)}{(2x-3)^2(6x-1)}}$$

36	51	−14	−24
−1 | 36	15	−29	5
1 | 36	87	−73	49 = 7²
−3/4 | 36	24	−32	0
−4/3 | 36	3	−18	0
2/3 | 36	75	36	0

24	−76	66	−9
−1 | 24	−100	166	−175
1 | 24	−52	14	5
3/2 | 24	−40	6	0
1/6 | 24	−72	54	0

+0 − 0 + 0 − 0 + ⊗ +

−4/3, −1, −3/4, 0, 1/6, 2/3, 1, 3/2

D_A $x \le -\frac{4}{3}$ or $-\frac{3}{4} \le x < \frac{1}{6}$ or $x \ge \frac{3}{2}$; $x \neq \frac{3}{2}$

$$B(x)=\frac{\sqrt{29}}{8x^5+60x^4+154x^3+153x^2+27x-27}$$

1, 3, 9, 27 / 1, 2, 4, 8

8	60	154	153	27	−27
−1 | 8	52	102	51	−24	−3
1 | 8	68	222	375	402	375
−3/2 | 8	48	82	30	−18	0
−3/2 | 8	24	41	15	−9	
−3/2 | 8	12	14	−6	0	
−3/2 | 8	6	2	−3		
−3/2 | 2	3	−1			
	1				

x^2+3x-1 NOT ±nice

$$x=\frac{-3\pm\sqrt{9+4}}{2}$$

D_B $x \neq \left\{\frac{3}{2}, \frac{-3\pm\sqrt{13}}{2}\right\}$

Triple Root